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SCIENTIFIC INFORMATION REPORT

Electronics and Engineering

(23)

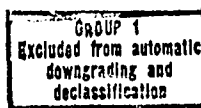
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23 November 1962

Prepared by

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SCIENTIFIC INFORMATION REPORTElectronics and Engineering (23)

This is a serialized report consisting of unevaluated information prepared as abstracts, summaries, and translations of the Sino-Soviet Bloc countries. It is issued in six series. Of these, four, Biology and Medicine, Electronics and Engineering, Chemistry and Metallurgy, and Physics and Mathematics, are issued monthly. The fifth series, Chinese Science, is issued twice monthly, and the sixth series, Organization and Administration of Soviet Science, is issued every 6 weeks. Individual items are unclassified unless otherwise indicated.

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I. ELECTRONICS

Acoustics1. Effect of Uneven Temperature Discontinuity on Underwater Signal

"Estimating the Fluctuations of the Amplitude and Phase of a Sound Wave in the Presence of an Uneven Interface of Two Media," by E. P. Gulin; Gor'kiy, Izvestiya VUZ, Radiofizika, Vol 5, No 4, 1962, pp 679-686

A perturbation method is used to estimate the fluctuations of amplitude and phase of a sound wave at a randomly rough interface of two media. On the basis of the results obtained, an attempt is made to estimate, for the case of a sound signal, the fluctuation of amplitude and phase caused by the heterogeneities of a temperature discontinuity layer in the sea.

2. Analysis of Hydrodynamic Sound Radiators

"Hydrodynamic Sound and Ultrasound Radiators," by G. Ya. Breyt-bart and A. V. Kortnev, Nauchn. zap. Odessk. politekhn. in-t (Scientific Notes of the Odessa Polytechnic Institute), No 37, 1962, pp 69-75 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 8, Aug 62, p 8-5-50)

"A critical examination is made of various formulas for selecting the operating frequency and fastening points of resonating plates used in hydrodynamic whistles. It is noted that calculations must include the influence of the sharpness of the ends and the surrounding area. The advantages and disadvantages of different methods for fastening resonators are analyzed. The authors point out that, due to the difficulty of determining nodal lines, whistles with bracket-type resonators operating at low frequencies are beginning to find wide application."

Annotated Index Selections3. Abstracts on Radio Electronics and Radio Engineering

Annotirovannyi Ukazatel' Literatury po Radioelektronika
(annotated Index of Literature on Radio Electronics),
No 17 and 18, 1962

Following are translations of selected abstracts from the above source. Numbers in brackets indicate the issue from which each abstract was selected.

1. "Voprosy magnitnykh izmereniy (Problems of Magnetic Measurements); Kiev, Publishing House of the Academy of Sciences Ukrainian SSR, 1961. [17]

"V. P. Karpenko, 'Use of an Owen Bridge for Measuring Magnetic Characteristics at High Frequencies,' pp 16-26, illustrated.

"This work is devoted to the development of a method for designing a bridge circuit which satisfies the demands of high sensitivity, good consistency, and sufficient accuracy for measurements in a frequency range of 100 kc to 3 Mc. The bridge is designed according to the following steps: (1) selection of a circuit for connecting the elements in the arms of the bridge; (2) analysis of errors due to leakage current in the elements of the bridge arms and methods of decreasing them; (3) selection of parameters in order to obtain satisfactory consistency of the bridge; (4) selection of parameters of the bridge on the basis of sensitivity; and (5) design of particular limits of measurements. Results of calculations are given in tables.

"S. G. Taranov, 'Design of Circuits for Compensation of Force in Hall Effect Transducers,' pp 38-44, illustrated.

"The author examines some circuit diagrams of Hall effect transducers and conditions for achieving maximum sensitivity of these circuits according to voltage or power. The linearity of the volt-ampere characteristic of transducers made of indium arsenide makes it possible to obtain a high sensitivity at large current input values (using artificial cooling methods). Simple circuit calculations are given for compensating for the dependence of temperature on Hall emf, as well as for compensating for internal resistance measurements of a transducer subjected to the influence of a magnetic field (Guassian effect).

"S. T. Usatenko, 'The Choice of Permanent Magnetic Materials for Magnetic Systems,' pp 45-52, illustrated.

"The article describes the physicotekhnical characteristics of contemporary Soviet materials which go into the manufacture of permanent magnetism (chemical composition, remanent induction, coercive force, etc.). The author describes the manufacturing features of highly coercive magnetic systems and approximate methods of designing magnets having a high magnetic flux and high stability with a comparatively small size.

"N. Ye. Fevraleva, 'Application of the Hall Effect for Measuring Field Intensity in the Testing of Permanent Magnets,' pp 53-57, illustrated.

"The use of Hall effect transducers for measuring field intensity in determining the demagnetization sectors of the hysteresis loops of permanent magnet materials is described. Measuring instruments based on the Hall effect, in comparison with those based on the Gaussian effect, have greater sensitivity and a more linear scale. The construction of a special holder for attaching the transducer to the magnet being tested and the electrical circuit of the instrument are given. Measurement errors, in comparison with results obtained by measuring field intensity with the pulse-induction method, do not exceed 1.5%.

"S. G. Taranov, 'Application of Indium Arsenide for Hall Effect Transducers,' pp 58-62, illustrated.

"Results are given for tests of Hall effect transducers based on InAs which have high carrier mobility ($\mu = 3 \cdot 10^4$ cm²/v.sec) and a low dependence of temperature on Hall emf. It is established that, for samples having dimensions of 4x2x0.5 mm, the permissible value of supply current does not exceed 1 a. The volt-ampere characteristic of InAs within the limits (prescribed by heating conditions) of permissible current I_p has a strictly linear nature (due to the weak dependence of resistance on temperature). The sensitivity of a Hall effect transducer for $I_p = 1$ a reached $S = 6.7$ μ v/oe. In a temperature range of 20-90° C for $B = 0-5,500$ gs, the relative change of Hall emf over 10° did not exceed 1.0%.

"N. Ye. Fevraleva and S. T. Usatenko, 'Distribution of Field Intensity and Magnetic Induction Along the Length of a Magnet Closed by a Magnetic Circuit,' pp 78-83, illustrated.

"To determine the optimum position of devices for measuring the induction of a field close to a test magnet, the authors have investigated the distribution of intensity and magnetic induction along the length of a sample for magnets of different size and configuration. The relative change of field intensity (the difference of values of intensity at the ends of the magnet and its neutral part relative to the field intensity at its neutral part) decreases with an increase in magnetizing current and increases with an increase in the length of the magnet. During demagnetization and with an increase in current, decreases to a great extent and has its smallest value close to a point corresponding to the coercive force. It is concluded that the instrument used to measure field intensity must be located at the neutral part of the test magnet and the instrument used to measure induction may be placed at the ends of the sample.

"N. Ye. Fevraleva, A. F. Nepokrytiy, and B. F. Ol'khovskiy, 'Testing Magnets of Complex Shape,' pp 84-89, illustrated.

"A method is described for determining the demagnetization loop of a hysteresis curve for magnets with a horseshoe (frame type) shape. Measurements were made by the pulse-induction method, and field intensity was measured with a Hall effect transducer. It is concluded that measurements of the field intensity of magnets having the described shape may be made by placing the measuring instrument on the outer side of the horseshoe, making it possible to determine the characteristics of the magnet with an error not exceeding 2-3%. Particular attention is devoted to the case of testing cylindrical magnets.

"V. V. Karpenko and A. V. Pruzhin, 'Investigation of Existing Methods of Measuring the Permeability of Ring Magnets,' pp 90-95, illustrated.

"Existing methods of investigating the properties of magnetic materials for operation at high frequencies are analyzed. An investigation of the errors obtained in measuring magnetic susceptibility on the basis of inductance and quality factor of a test circuit shows that measurement accuracy increases with a decrease in leakage, that is, with a greater number of turns; in investigations it is best to proceed from conditions of approximation of the test sample to conditions of its exploitation (in selecting the number of turns of the magnetizing coil). At high frequencies and with taps in the windings, the remaining dead turns sharply increase the effect of the coil capacitance.

"V. P. Karpenko and G. I. Lyubchenko, 'Problems of the Design of a Differential Calorimeter for Magnetic Measurements,' pp 96-101, illustrated.

"The article examines the requirements which must be satisfied in constructing a calorimeter used in an apparatus for determining losses in a ferromagnetic sample placed in an electromagnetic field. Conditions are presented for selecting the dimensions and material of the vessels, insulation of the calorimeter, liquid for filling the vessel, number of thermocouples for controlling the temperature in the vessels, the material and diameter of the thermal electrodes, and the measuring instrument. As an example, the authors describe a calorimeter built for measuring losses in ferromagnetic materials at frequencies from 100 kc to 3 Mc.

"N. Ye. Fevraleva and S. G. Maranov, 'Application of the Hall Effect for Determining the Coercive Force of Soft Magnetic Materials,' pp 102-106, illustrated.

"A description is given of a coercive force meter used to test soft magnetic materials with coercive forces from 0.1 to 5 oersteds in which the sensing element is based on the Hall effect. In testing materials with small values of coercive force, the external magnetic fields have an effect on the sensing element. In addition to external fields, results of measurements are also influenced by the action of fields created by the circuit which supplies the pickup of the meter itself. The sensitivity of the measuring element is 31.8 microvolts/oersted. The threshold of sensitivity of the measuring element relative to external permanent magnetic fields in the absence of a test sample reaches 0.015 oersted.

"V. M. Il'in, 'A Balance Indicator for AC Balancing Networks for Testing Ferromagnetic Materials at High Frequencies,' pp 11-114, illustrated.

"A balance indicator having the necessary sensitivity and sufficient selectivity to avoid higher harmonic components is described. The voltage sensitivity of the indicator is one mm/microvolt. In returning the instrument from 400 to 20,000 cps, the irregularity of sensitivity reached 3 db. With a rated output voltage of one v, nonlinear distortion of the amplifier of the balance indicator does not exceed 1-2%. The input resistance of the instrument varies from 5.103 to 1.105 ohms. A principle diagram of the instrument is given.

"S. S. Khrizman and G. I. Gurshiy, 'Balanced Selective Amplifier for Magnetic Measurements at a Frequency of One Mc,' pp 115-118, illustrated.

"The article describes the design and construction of a three-stage selective amplifier for bridge circuit indicators with a balanced input, tuned to a frequency of one Mc. This amplifier is connected in the measuring diagonal of the bridge and does not introduce substantial errors into the results of measurements. The basic characteristics of the amplifier are: (1) input resistance 2.0 Megohms; (2) maximum gain factor at a frequency of 1.0 Mc -- 1.105; (3) pass-band -- 4 kc; (4) second harmonic suppression -- 58 db; and (5) network power requirement -- 20 va. The principle diagram of the instrument is given.

"A. F. Nepokrytiy, 'Results of One Observation of the Stability of Permanent Magnets,' pp 125-127, illustrated.

"The decrease in residual flux of magnets made of AH3 and AHKo3 alloys was observed. The results provide a basis for considering that magnets made of the above alloys are sufficiently stable. After aging by 7-14% they are capable of working even in measuring systems where the requirements for flux stability are determined by ten parts of a percent. In apparatus where a flux instability of several percent is not essentially important, one need not resort to aging.

2. "Neyrokibernetika (Neurocybernetics), by S. N. Braynes, A. V. Napalkov, and V. B. Svechinskiy; Moscow, Medgiz Publishing House, 1962 172 pp, illustrated. [17]

"A definition of neurocybernetics is given. The concepts of cybernetics are used for the study of fundamental relationships which appear in complex systems. In neurocybernetic experiments, one considers algorithms which form the basis for the development of reflex networks and the formation of complex patterns of behavior of animals under different environmental conditions. The authors examine questions of reliability in biological systems, modeling of systems of conditioned reflexes, and the formation of new programs on the basis of the reprocessing of previously stored information. Problems of the classification of ideas and the formation of concepts by automatons and some aspects of the use of neurocybernetics in physiology and medicine are discussed.

3. "Drosseli fil'trov radioapparatury (Filter Chokes for Radio Equipment), by A. M. Bamdas and Yu. A. Savinovskiy; Moscow, Sovetskoye Radio Publishing House, 1962, 190 pp, illustrated. [17]

"This book is devoted to chokes used in smoothing filters of rectifiers in various types of radio electronic equipment. General information on the design of contemporary chokes with ferromagnetic cores is given. The authors describe the properties of materials used in the manufacture of chokes for mass-produced equipment. Elements of the theory of nonlinear chokes and the calculation of their various operating conditions are given. An engineering method of designing different chokes, as well as their nomenclature, is presented. Examples of calculations and the necessary computed values and relationships are given. The book is intended for radio engineers and may also serve as a reference aid for students of radioengineering and electrical engineering departments of higher and secondary educational institutions.

4. "Lineynyye sistemy avtomaticheskogo upravleniya s peremennymi parametrami (Linear Systems of Automatic Control With Variable Parameters), by A. V. Solodov; Moscow, Fizmatgiz Publishing House, 1962, 324 pp, illustrated. [18]

"The author examines the basic characteristic of linear systems -- the impulse transfer function -- and discuss the theory of the structural transformations of systems with variable parameters based on the use of linear differential operators. Approximate methods of finding impulse transfer functions are described. The book gives methods of investigating systems with variable parameters, subjected to the action of random signals, with the aid of modeling devices. The book contains a great deal of new material: the theory of structural transformations, some methods of determining impulse transfer functions, determination of dynamic errors in servo systems with variable parameters, the theory of inverse systems, and several other problems.

5. "Statisticheskiy metody analiza i kontrolya kachestva i nadezhnosti (Statistical Methods of the Analysis and Control of Quality and Reliability), by Ya. B. Shor; Moscow, Sovetskoye Radio Publishing House 1962, 552,pp, illustrated. [18]

"This book is written for a broad category of engineers (of scientific-research institutes, design bureaus, artillery firing ranges, and plants) concerned with determining the quality and reliability of radio electronic equipment and other mass-produced parts of industry (machine building, instrument building, artillery, etc.). The author describes the application of methods of mathematical statistics to problems of the processing and evaluation of results of tests in which the quality and reliability of the tested objects are determined. For the convenience of readers, the book gives the necessary information on mathematical statistics and a large number of auxiliary mathematical tables to help in carrying out the required calculations. The presentation is illustrated with a large number of examples taken from the field of radio electronics and artillery engineering.

6. "Ustraneniye neispravnosti sudovykh radiolokatorov (Correction of Faults in Shipborne Radars), by S. P. Ksenz and others; Moscow, Morskoy Transport Publishing House, 1962, 232,pp, illustrated. [18]

"In this book, the authors examine the faults of marine navigation radar stations used on freighters and ships of the fishing industry. The work is intended as a manual for the repair of radars by those persons who have no experience in the detection and correction of faults but who, because of the nature of their service, are connected with problems of the operation of radar stations in isolated navigation. The manual includes a rational method which will facilitate the process of searching for the causes of faults. This method, which is proposed to the reader for application to circular scan radars, may also be successfully used in the exploitation of other radioelectronic equipment.

7. "Dal'neye rasprostraneniye ul'trakorotkikh voln (Long-Range Propagation of Ultrashort Waves), by M. P. Dolukhanov; Moscow, Svyaz' izdat Publishing House, 1962, 177 pp, illustrated. [18]

"Currently known methods of transmitting information over great distances through the use of processes of long-range ultrashort-wave propagation are examined in this book. All the examined methods of designing ultrashort-wave communication lines are based on the widely used concept of propagation losses. The recommended methods are explained with concrete numerical examples which facilitate to a significant extent the comprehension of the material. A list of abbreviations is appended.

8. "Elektrotekhnika. Elektronika (Electrical Engineering. Electronics), Collection of terms, No 59; Moscow, Publishing House of the Academy of Sciences USSR, 1962, 227 pp. [18]

"This terminology is recommended by the Committee on Technical Terminology of the Academy of Sciences USSR for use in scientific-technical literature, education, standards, and technical documentation. The terminology has been recommended by the Ministry of Higher and Secondary Special Education USSR for higher and secondary educational institutions. The terms have been examined from the viewpoint of linguistic standards by the Institute of the Russian Language of the Academy of Sciences USSR. The edition contains terminology on the following fields of electrical engineering, electrical machines (types of electrical machines), relays, electric vacuum instruments, and dielectrics.

9. "Poveritelyu radioizmeritel'nykh priborov (For Testers of Radio Measuring Instruments), by A. N. Pashkov and V. P. Korsakov; Moscow, Voenizdat Publishing House, 1962, 454 pp, illustrated. [18]

"This book represents a manual for the training of testors of radio-measuring instruments. It includes fundamentals of metrology, the theory of radio measurements, devices and methods of testing measuring apparatus, and information on typical measuring instruments. In each chapter, particular attention is devoted to detailed testing diagrams which substantiate the method of checking standard types of instruments. The book is written for persons with a secondary and secondary-technical education.

10. "Bol'shoy televizionnyy ekran (Large Television Screen), by V. F. Samoylov; Moscow/Leningrad, Gosenergoizdat Publishing House, 1962, 64 pp, illustrated. [18]

"In this brochure, the author examines fundamentals of the theory of operation of television projection systems designed for producing a large screen, shows examples of appropriate calculations which illustrate advantages and disadvantages of these systems, and given brief characteristics and design elements of projection equipment which have been realized in practice. The brochure is intended for radio amateurs interested in television engineering.

11. "Massovyye televizionnyye priyemniki III klassa (Popular Third Class Television Receivers), by N. Z. Lomozova and G. M. Kurbakova; Moscow, Svyaz'izdat Publishing House, 1962, 48 pp, illustrated. [18]

"The authors consider the basic trends for the further improvement of television receivers, as well as circuitry and structural features of contemporary models of third class [III klass] television receivers ("Zarya-2", "Aputnik", "Volkhov", "Vesna", "Neva", and "Rekord-4").

Cathode Electronics

4. Inelastic Scattering and Secondary Emission of Solids

"Inelastic Scattering of Electrons and Secondary Electron Emission of Solids," by I. M. Bronshteyn and B. S. Frayman; Moscow, Radiotekhnika i Elektronika, Vol 7, No 9, Sept 62, pp 1643-1648

The mean free paths of medium energy electrons in Ni, Cu, Ga, Tl, Sn, Ge, Sr, Ag, and In are determined. Using a $\delta - \eta$ diagram (where δ and η are coefficients of secondary electron emission of slow secondary and fast inelastically reflected primary electrons), the authors evaluate the role of inelastically reflected electrons in the secondary electron emission of Ga, Ge, Sr, In, Sn, and Tl and determine the parameters which characterize secondary electron emission (λ , S , δ , and δ_0). The influence of the work function on secondary electron emission is explained.

This work was presented at the Tenth Conference on Cathode Electronics, which was held on 23-30 November 1961 in Tashkent.

5. Investigation of Tellurium-Cesium Photocathodes

"Some Characteristics of Tellurium-Cesium Photocathodes," by M. A. Polyakova; Moscow, Radiotekhnika i Elektronika, Vol 7, No 9, Sep 62, pp 1626-1631

Tellurium-cesium photocathodes were prepared by evaporation of 99.999% pure tellurium on the wall of an uviole glass flask in a vacuum of $\sim (1-2) \cdot 10^{-7}$ mm Hg at room temperature. The cathodes were then activated in cesium vapor at a temperature of 120°C . The change in photocurrent during activation was controlled by means of light from a bactericidal lamp, while simultaneous measurements were made of dark current and resistance of the layer. Spectral characteristics of Te-Cs cathodes in transmitted and reflected light were obtained. A maximum in the region of 260-270 millimicrons was observed for cesium telluride on a chromium base with frontal illumination. This maximum was somewhat displaced toward the long-wave side of the spectrum upon illumination from the rear. The quantum efficiency of the photocathode at the maximum of the spectral characteristic reached 17% when illuminated from the side of the vacuum.

The author expresses his tanks to T. M. Lifshits for his support of the work.

This work was presented at the Tenth Conference on Cathode Electronics which was held from 23-30 November 1961 in Tashkent.

6. Autoelectronic Emission From High-Melting Cathodes

"Autoelectronic Cathodes Based on Metal-Like High-Melting Compounds," by M. I. Yelinson and G. A. Kudintseva; Moscow, Radio-tekhnika i Elektronika, Vol 7, No 9, Sep 62, pp 1511-1518

This work is devoted to the creation of a technique for making autoelectronic cathodes based on metal-like high-melting compounds (borides and carbides), an investigation of surface migration and the stability of these compounds to ion bombardment, and a thorough examination of their autoelectronic emission characteristics, including limiting current densities, the influence of different gas atmospheres, and an investigation of operating life. The majority of the experiments were conducted with LaB_6 and ZrC , while TiC , W_2C , and W_2B_5 were also used in the tests. A number of special melting methods were tried, and one, which proved suitable for all the substances examined, was selected.

Results showed that the limiting densities of stationary currents was $\sim 10^8$ a/cm² for pulse conditions and $\sim 10^6$ a/cm² for static conditions. The resistance of LaB_6 to ion bombardment is an order of magnitude greater than that of tungsten, while the resistance of ZrC is four orders of magnitude greater. Cathodes based on the compounds described have a number of advantages over tungsten cathodes and may operate at pressures of $\sim 10^{-7}$ mm Hg. A flat thermal autoelectronic cathode was created using LaB_6 as the coating which provided a current density of $\sim 10^4$ a/cm².

This work was presented at the Tenth Conference on Cathode Electronics which was held from 23-to 30 November 1961 in Tashkent.

7. Investigation of Pre-Arc Phenomena on Coated Cathodes

"The Influence of Different Coatings on the Nature of Phenomena Preceding the Destruction of Tungsten Emitters by High-Density Autoelectronic Current Pulses," by I. L. Sokol'skaya and G. N. Fursey, Leningrad State University imeni A. A. Zhdanov; Moscow, Radiotekhnika i Elektronika, Vol 7, No 9, Sep 62, pp 1484-1494

The purpose of this work was to study changes occurring in the pre-arc period on the surface of an emitter coated with films of foreign atoms, making it possible to vary the work function, field intensity at the

emitter surface, the shape of the potential barrier, and space charge distribution. An increase in the role of the space charge was noted for coatings which decreased the work function (barium). Migration and evaporation of barium on tungsten were observed when the emitter was spontaneously heated during the course of a pulse. The temperature of the emitter point during the pre-arc period was estimated to be between 2,000 and 2,500° K. Pre-arc phenomena were also observed for rebuilt tungsten points and tungsten carbide. The existence of pulsations in the voltampere characteristics was also verified.

This work was presented at the Tenth Conference on Cathode Electronics which was held from 23 to 30 November 1961 in Tashkent.

Circuit Theory8. Interception of Radar Signal With Aid of Several Channels

"Optimum Detection of Radar Signal With the Aid of Several Reception Channels," by V. B. Fedorov; Moscow, Radiotekhnika, No 9, Sep 62, pp 60-67

Detection of a useful radar signal arriving simultaneously through several information channels of a radar system with multilobe radiation has been studied. In such a system, the signal reflected from the target is simultaneously intercepted at the same frequency by several receiving antennas, although the intensity of signals received by each antenna depends on the particular lobe feeding that antenna.

An expression is derived for the coefficient of noise for individual channels. It was shown that the problem of optimum reception with the aid of several information channels can be reduced to the problem of optimum reception on the basis of data for a single channel with appropriate change in the magnitude of the useful signal and the noise level.

9. Logical Functions in One Class of Ferrite Transistor Circuits

"Realizing Logical Functions in One Class of Functional Circuitry," by D. A. Pospelov, Moscow Power Engineering Institute; Gor'kiy, Izvestiya VUZ, Radiofizika, Vol 5, No 4, 1962, pp 784-790

The realization of logical functions is considered for a class of ferrite transistor circuits, without use of restrictive networks of the method of current summation. A paraphase code is introduced to retain the universality of the circuits constructs on this principle. Circuits are given for the main logic functions.

The practical work was done in the period 1958-1960 at the Moscow Power Engineering Institute, under the direction of A. G. Shigin.

10. Triphase Code for Modeling Ternary Functions

"Realizing Ternary Functions With the Use of Triphase Codes," by D. A. Pospelov and V. N. Fal'k, Moscow, Power Engineering Institute; Gor'kiy, Izvestiya VUZ; Radiofizika, Vol 5, No 4, 1962, pp 791-798

The fundamental relationships of ternary logic with the code - 1, 0, 1 are first described, and then the modeling of the basic ternary logic functions by introducing the three-phase code is discussed. The circuit of a single-digit coincidence ternary summator is given.

11. Self-Oscillators With Two and Three Parametrically Connected Degrees of Freedom

"On the Reaction of Parametrically Excited Systems to a Self-Oscillator Which Changes a Parameter," by Yu. V. Grigor'yev; Moscow, Radiotekhnika i Elektronika, Vol 7, No 10, pp 1838-1841

R. V. Khokhlov, who suggested this work, and the author showed earlier (Radiotekhnika i Elektronika, Vol 6, No 10, Oct 61, p 1617) that the response of parametrically excited oscillations to an apparatus which changes the energy-capacity parameter leads to a limitation of the amplitude of the oscillations excited in the linear system (for a self-oscillatory system with two parametrically connected degrees of freedom).

Here the results obtained in the earlier work are generalized for the case of a self-oscillator which changes a reactive parameter in a two-circuit parametric generator (i.e., generalized for the case of a self-oscillatory system with three parametrically connected degrees of freedom).

It is found that all those fundamental rules which apply to self-oscillatory systems with three parametrically connected degrees of freedom are likewise inherent in the systems with two parametrically connected degrees of freedom, although differences may arise in the case of strong asymmetry in the decrements of attenuation of the circuits.

12. Transition From Wave-to-Geometric Optics for Anisotropic Dielectric

"On the Geometrical Optics of an Anisotropic Dielectric,"
by Yu. A. Zaytsev; Moscow, Radiotekhnika i Elektronika, Vol
7, No 10, Oct 62, pp 1826-1829

Formulas are given for the transition from wave optics to geometric optics for an Anisotropic dielectric. Five of the 26 formulas completely describe the structure of the electromagnetic field in the anisotropic dielectric.

The rotation of the field vectors in the plane perpendicular to the radial vector depends not only on the bending of the ray, but also on the anisotropy of the medium.

13. High-Frequency Oscillations in an Ion Pump Discharge

"High-Frequency Radiation of a Discharge in an Ion Pump With Cold Cathodes," by E. M. Reykhrudel', G. V. Smirnitskaya, and E. P. Sheretov, Physics Institute, Moscow State University, and Ryazan' Radio Engineering Institute; Moscow, Radiotekhnika i Elektronika, Vol 7, No 10, Oct 62, pp 1809-1815

In a study of high-frequency oscillations in the discharge of an ion pump with cold cathodes and longitudinal magnetic field, a calculation of the properties of electron motion in the ion pump demonstrated relationships between the expected frequencies of the oscillations and the geometry of the discharge gap and the discharge parameters. Those theoretical relationships were in good agreement with experimental data. The electrons excited in the plane of the anode and those which oscillate between the cathode planes produce the space charges.

The influence of the space charge on the frequency of the oscillations is discussed.

14. Intrinsic Noise in Ferrite Microwave Amplifier

"Theory of the Noise Factor of the Microwave Ferrite Amplifier," by Ya. A. Monosov; Moscow, Radiotekhnika i Elektronika, Vol 7, No 10, Oct 62, pp 1738-1748

In a calculation of the noise factor of a ferrite microwave magnetostatic amplifier, it is shown that the intrinsic noises of the amplifier are sharply reduced as the resonator is increasingly filled with the ferrite

(as $(a/r_0)^5$, where a and r_0 are the radii of the ferrite specimen and the resonator, respectively) and when $a/r_0 \approx 0.04$ asymptotically approaches the value for a parametric amplifier incorporating semiconductor diodes. An analogous dependence exists when the operating wave lengths are shortened. Intrinsic noises are reduced as the resonance band narrows and as the magnetic saturation of the ferrite and the Q-factor of the resonator are increased.

A physical interpretation of the results is given.

A. A. Pistol'kors and S. M. Rytov were consulted in the work.

15. Delay of Mutual Coupling in Two Self-Excited Oscillatory Systems

"On the Mutual Synchronization of Self-Exciting Systems,"
by V. P. Rubanik, Chernovitsy University; Moscow, Radiotekhnika
i Elektronika, Vol 7, No 10, Oct 62, pp 1711-1719

A method developed earlier by the author (Nauchnyy Yezhegodnik
Chernovitskogo Universiteta za 1959 / 1959 Scientific Yearbook of Chernovitsy
University, 1960, p 533) is used here to estimate the influence of a
delay of coupling forces on the processes involved in the mutual
synchronization of two inductively coupled self-oscillators with slightly
different natural frequencies. The treatment assumes arbitrary delay values
and weak coupling forces.

It is concluded that a delay of the mutual coupling forces of such
systems considerably influences the processes of mutual synchronization
and must always be taken into account in practical calculations of
coupled oscillatory systems.

16. Relay Circuits With Mutual Locking-Out Contacts

"A Method of Rearranging Relay Circuits With Mutual
Locking-Out Contacts," by A. N. Yurasov; Sbornik Statey
Vsesoyuznogo Zaochnogo Politekhnikeskogo Instituta
(Collection of Articles of the All-Union Correspondence
Polytechnic Institute), No 24, 1960, pp 135-142 (from
Referativnyy Zhurnal -- Avtomatika i Radioelektronika,
No 5, 1962, 5-2-125 i)

A method is presented for designing relay-contact bridge circuits
in which false networks are eliminated by mutual locking-out contacts.
The detection of the false networks is done by a comparison of different
terms of the structural formula, taking just two terms at first, and then
by comparing pairs, etc. For circuits with several reacting organs, the
following order of operations is recommended:

1. The brackets are removed so that each term will contain one reacting organ;
2. There is a selection of pairs of terms containing the greatest number of common contacts and differing from the mutual lock-out contacts of one element, the common contacts being put before the brackets;
3. Analogously, each pair is joined with one still unjoined term of the formula, whereby different contacts are transferred to the right side of the formula, etc.;
4. All joining is done in accordance with the rules of the algebra of contact circuits;
5. The left and right sides of the formula are connected by the sign of the multipolar sequential join.

17. Synchronization of Linear Self-Oscillators

"Synchronization of Pulsed Self-Oscillator Operating Under Linear Conditions," by V. I. Grigulevich; Moscow, Elektrosvyaz', No 9, Sep 62, pp 26-32

The author establishes the basic conditions for synchronization of pulsed self-oscillators operating in a linear regime (a linear regime is characterized by the absence of a limiting cycle of self-oscillations in the pulses; the oscillations are quenched before they achieve a stationary state). The results of this work and a previous work by the author ("On the Question of Phase Stabilization in Pulsed Self-Oscillators," Elektrosvyaz', No 8, 1962) are intended to facilitate the design of frequency multipliers.

The present article was based on material obtained in research work performed by the chair of radio transmitting equipment of the Odessa Electrical Engineering Institute of Communications.

Components

18. Aperiodic Nonlinear Amplifiers

"Aperiodic Nonlinear Amplifier With Stable Band-Pass," by G. M. Krylov; Moscow, Radiotekhnika, No 9, Sep 62, pp 35-39

Aperiodic amplifiers with nonlinear amplitude characteristic are often used in wide-band centimeter-wave receivers, in which the signals are either detected immediately after the antenna or amplified in a

high-frequency preamplifier and then further amplified to the desired level in a video amplifier. The intensity of the input signal often varies in the dynamic range from 60 to 100 db.

It was observed that in passage of pulsed signals through a nonlinear amplifier, the wave form distortion depends on the amplitude of the input signal. Several methods for correcting the frequency response of nonlinear amplifiers are advanced. Such methods permit the stabilizing of the operation in a wide dynamic range of input signals.

Aperiodic nonlinear amplifiers utilizing the suggested methods of frequency response correction have very good operating characteristics for signals of variable intensity.

19. Testing of Electrolytic Capacitors Automated

"Automatic Bridge for Processing Electrolytic Capacitors,"
by N. B. Karandeyev, F. B. Grinevich, and V. P. Shul'ts;
Novosibirsk, Avtomaticheskii Kontrol' i Elektricheskaya
Izmereniya, (Automatic Control and Electrical Measurement --
a collection of articles), No 2, 1960, pp 5-20 (from
Referativnyy Zhurnal -- Elektrotekhnika i Energetika, No
16, 1962, 16 B 43)

At the Institute of Automation and Electrometrology of the Siberian Department, Academy of Sciences USSR, theoretical studies were made of the automation of the control of the parameters of electrolytic capacitors, the result of which was the designing of an automatic bridge for processing type KE-2 capacitors with ratings of 10, 20, and 30 microfarads and 150, 300, 400 and 450 volts. The processing is done according to the capacitance (acceptance range minus 15 to minus 45 percent), according to loss angle ($\text{tg} \delta \leq 0.09$), and current leakage (not over 0.13 - 0.5 milliamperes, depending on the capacitance and voltage). The processing errors are plus-minus 2 percent, 10 percent, and plus-minus 5 percent, respectively, for capacitance, loss factor, and current leakage. The bridge can test 3,600 capacitors per hour. It operates on 220 volts, 50 cycles, at ambient temperatures of 15-25 deg C and 80 percent relative humidity. The article describes the operation and gives block diagrams.

20. Cadmium Selenide Photoconductors

"Type FS-D Cadmium Selenide Photoconductors," by B. T. Kolomiyets and A. O. Olesk; Moscow, Elektichestvo, No 10, Oct 62, pp 71-75

USSR industry manufactures two types of cadmium selenide photoconductors made of polycrystalline cadmium selenide in dust form. These photocells are designated FS-D, followed either by an "0" or "1", depending on the nature of their construction. The light-sensitive element of both types is in the form of a flat disc 8 mm in diameter and 0.5-0.8 mm thick. On one surface of the disc are two graphite electrodes placed at a distance of 4 mm from each other. The light-sensitive surface has measures 7.5 X 4 mm.

In the type FS-D0 photoconductor, the light-sensitive element is glued to a 14.5 X 8.5 X 1.5-mm glass plate with silver electrodes. The FS-D0 is generally intended for inaccessible parts of an instrument.

In the type FS-D1 photoconductors, the light-sensitive element is encapsuled in plastics. The properties and parameters of both types of photoconductors are identical. Spectral response of the photoconductors is such that maximum sensitivity is at the boundary of the visible and infra-red spectrum (0.75 microns). The sensitivity of cadmium selenide photoconductors is high and varies in a range from 20.10 to 30.10³ microamp/lux.v.

21. Cooling Permits Operation of VG-10 Rectifiers at 40 Amperes

"Admissible DC Values in Germanium Rectifiers," by L. A. Rutmanis and Ya. K. Shinka, Trudy Instituta Energetiki i Elektrotekhniki. AN Latv CCR (Works of the Institute of Power Engineering and Electrical Engineering. Academy of Sciences Latvian SSR), No 11, 1961, pp 41-54 (from Referativnyy Zhurnal -- Avtomatike i Radioelektronika, No 5, 1962, 5-4-24 v)

Studies showed that the density of the direct current in the BG-10 type germanium rectifier could be increased considerably by the use of effective cooling; the use of an aluminum fin cooler with a cooling surface of 800 cm² permitted operation at average current values of 40 amperes. The maximum temperature developed at the electron-hole junction on the indium side. The internal resistance of the heat transfer corresponded to 0.9°C per watt.

22. Voltage Breakdown in VG-10 Germanium Rectifiers

"Inverse Voltage of Germanium Rectifier Devices," by T. Ya. Puritis and Ya. K. Shink; Trudy Instituta Energetiki i Elektrotekhniki. AN Latv SSR (Works of the Institute of Power Engineering and Electrical Engineering. Academy of Sciences Latvian SSR), No 11, 1961, pp 17-40 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 5, 1962, 5-4-23 shch)

A detailed examination of the physical processes that cause breakdown in germanium devices showed that voltage breakdown is caused for the most part by thermal or thermoelectric failure (thermal or shock ionization).

Testing methods are described in detail, as well as the results of a great number of voltage breakdown measurements for type VG-10 germanium rectifiers at various temperatures. The breakdown voltage was found to be that voltage at which an inverse current of 10 watts begins to flow. The average values of the temperature coefficient of voltage breakdown were obtained as follows: electrical breakdown: 0; thermoelectric breakdown: 0.5×10^{-2} ; and thermal breakdown: $1.1 \times 10^{-2} \text{ deg}^{-1}$. The type of breakdown was determined by the nature of the temperature dependence of the voltage breakdown.

23. Operating Range of the VG-10 Germanium Rectifier

"The Operating Range of Germanium Rectifiers," by Ya. K. Shinka; Trudy Instituta Energetiki i Elektrotekhniki. AN Latv CCR (Works of the Institute of Power Engineering and Electrical Engineering. Academy of Sciences Latvian SSR), No 11, 1961, pp 55-60 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 5, 1962, 5-4-24 i)

With VG-10 germanium rectifier used as an example, a method is given of estimating the admissible voltage and current loads for various ambient temperatures. For the case in which the rectifier is used under other than normal conditions, the range of admissible load values is described graphically by a rectangular system of coordinated for experimentally obtained values of admissible load current and inverse voltage for various temperatures or for various conditions of cooling.

24. H-Guide Still Does Not Compete With Standard Rectangular Wave Guide

"Some Remarks Regarding the Calculations of Losses in a Metallodielectric H-Guide," by E. M. Guttsayt, Moscow Power Engineering Institute, Chair of Electronic Instruments; Moscow, Radiotekhnika i Elektronika, Vol 7, No 10, Oct 62, pp 1831-1834

As an item of interest in the Cohn-Tischer dispute (M. Cohn /Tischer's Comment/, "Attenuation of the HE_{11} Mode in the H-Guide," IRE Tran. MIT-7, No 4, 1959, p 478; No 2, 1959, p 202), this work contributes formulas, obtained some years ago with assistance of students Chu Ch'un-tung and Yu. D. Deniskin, for determining the losses for three lower types of waves in the H-section of a metallodielectric wave guide and compares these with formulas of Cohn and Tischer.

It is concluded tha, disregarding disruptive strength, the H-guide will not be able to compete with the standard rectangular wave guide until new and better dielectric materials come on the scene.

25. Hall-Effect Amplitude Modulator

"Amplitude Modulation With the Aid of the Hall Effect," by M. Ye. Mazurov and I. N. Prudnikov; Moscow, Radiotekhnika i Elektronika, Vol 7, No 10, Oct 62, pp 1720-1729

A study of circuit designs, frequency limitations, efficiency, and output power of Hall-effect amplitude modulators indicates that the useful signal level can be raised more than 70 decibels above the level of the parasitic spectral components, while maintaining output power in the kilowatt class. Present Hall-effect amplitude modulators afford the possibility of a signal multiplication in a frequency range of zero to several megacycles in the Hall generator and from zero to several tens of kilocycles in the magnetic system, and such modulators are much simpler than ordinary ones containing filters.

The work reported here was supervised by A. A. Kharkevich (Nelineynnye i Parametricheskiye Yavleniya v Radiotekhnike /Nonliner and Parametric Phenomena in Radio Engineering/ 1956).

Information Theory26. Nonbinary Signal-Correcting Codes

"Compiling Nonbinary Correction Codes, and Estimating the Number of Signals in Them" by V. M. Ostianu; Moscow, Problemy Peredachi Informatsii (Problems of the Transmission of Information -- a collection of articles), No 10, 1961, pp 42-48 (from Referativnyy Zhurnal -- Avtomatike i Radioelektronika, No 5, 1962, 5-2-199 v)

Linear, nonbinary, error-correcting codes are considered, as well as a method of compiling them and estimating the number of signals in them. The results obtained in this work represent a further development and generalization of the work of R. R. Varsharov (Doklady Akademii Nauk SSSR, Vol 117, No 5, 1957, p 739).

The set v^n of the sequence $a = a_1, a_2, \dots, a_n$, where each sign a_i receives a value in a class of residues according to the absolute value v , represents an additive Abelian group $G_{n,v}$. The subgroup Δ_n , selected in corresponding form, represents a set of code combinations. A number of lemmas and theorems are demonstrated for such codes; in particular, the code spacings of the union and the sums of the subgroups of the group $G_{n,v}$ coincide (under the distance between the pair of elements a_i and a_j is understood the number of noncoincident signs).

Instruments and Equipment27. High Precision Instrucment for Magnetic Field Measurement

"High Precision Meter of Magnetic Field Intensity,"
by G. K. Yagola and Ye. Ye. Bogatyrev; Moscow, Izmeritel'-
naya Tekhnika, No 9, Sep 62, pp 41-42

At the Khar'kov State Institute for Measures and Measuring Instruments a high-precision nuclear instrument for measuring magentic field intensity, has been built. This instrument incorporates a frequency meter ChE-1 having a range of 1-17 Mc. Magnetic field measurements can be made in a range of 250-25,000 oersteds with the aid of five interchangeable probes. The over-all size of each probe is 10 x 16 x 40 mm.

The resonating substance is placed into a cylindrical glass ampule 25 mm long and 3 mm in diameter. The circuit coil of the probe is wound in the central part of the ampule for a distance of 10 mm. The modulation coil is made of two halves placed symmetrically with respect to the ampule axis and contains 125 turns. The body of the measuring probe is made of electrolytic copper 0.8 mm thick.

The constant of the measuring probes for protons was determined on the basis of absolute measurement of the gyromagnetic ratio of the proton. The constants of the measuring probes for lithium and deuterium were determined by measuring the atio of the resonance frequencies of these nuclei to that of the proton.

It was found that the device is able to measure the intensity of a uniform magnetic field with a relative accuracy of $2 \cdot 10^{-5}$. Such an instrument utilizing the resonance of the proton, lithium or deuterium can serve as a standard device for calibrating conventional magnetic field meters.

28. Accurate Measurement of Small Openings

"Measurement of Small Openings With the 'Magic Eye,'" by
B. Ya. Verkhoturov; Moscow, Izmeritel'naya Tekhnika, No 9,
Sep 62, pp 12-14

Taking into consideration the needs of industry for accurate measurement of very small openings, the Chelyabinsk Plant of Measuring Instruments has designed and built an experimental attachment with magic eye for a universal microscope. The tube 6E5 is utilized here as a magic

eye. At the instant of contact of the measuring tip with the side of the opening, the 6E5 tube generates a signal indicating the establishment of actual contact. The part with the opening to be measured is first mounted on the stage of the microscope. The tip of a measuring probe is introduced into the opening to a certain depth, and by measuring the diametrical spacing and the diameter of the measuring tip at the level of contact, the size of the opening is determined. The error of measurement with this device does not exceed 1.65 microns.

Thorough studies of the accuracy of the method of diameter measurement with a universal microscope with magic eye have shown that this is the most accurate of all available contact methods and that it can be recommended for measurement of first-class-accuracy openings.

29. Instrument for Checking Performance of Internal Combustion Engines

"Cybernetics Into the Tractor Shops," by B. Pavlov; Moscow, Sovetskaya Rossiya, 30 Sep 62, p 2

The Siberian Affiliate of the All-Union Scientific Research Institute for Mechanization of Agriculture developed a device which quickly determines the malfunctioning of an internal combustion engine.

The development of such a device was most timely, since many of the Soviet experts consider it quite normal that such tractors as "DT-54" or "Belarus" break down after almost every 100 hours of operation and require a complete overhaul.

30. Transistorized High-Precision Synchronizing Instrument

"Precision Synchronizing Device Built With Semiconductor Triodes," by A. B. Florinskiy, Moscow Power Engineering Institute; Minsk, Izvestiya Vysshikh Uchebnykh Zavedeniy, Energetika, No 8, Aug 62, pp 98-100

A high-precision synchronizing instrument (synchroscope) incorporating transistors and semiconductor diodes was designed at the Automation and Telemechanics Chair of the Moscow Power Engineering Institute. This type of synchroscope is superior to the commonly used instruments incorporating electromagnetic relays and vacuum tubes.

At the proper instant, the instrument generates a signal which actuates a contactor and connects a reserve synchronous generator to the power line. Such an actuating signal leads in time the actual instant of the generator and line phase coincidence by the value needed to close the contactors. The voltage difference between generator terminals

and the power line is also compared at the same time. The generator and power line voltage is first stepped down to 120 v, and then their difference is fed to a rectifying bridge. The rectified pulsating voltage is fed to a RC filter. The transfer function of the filter is selected in such a manner that it leads the instant of phase coincidence by a predetermined time interval. This synchroscope, in addition to being very accurate, has provision for independent indications, i.e., change in frequency does not affect the voltage reading and vice versa.

The instrument was tested at the Moscow Power Engineering Institute and showed very good operating characteristics.

31. Micro-Wire Winding Device

"Scientific-Research Institute of Electrical Engineering Industry at the Moldavian SSR Sovnarkhoz"; Kishinev, Sovietskaya Moldaviya, 4 Jul 62, p 2

A short photo caption reads as follows:

"A 3-year effort to build an automatic device for winding micro-wire resistors is now almost completed. This device will be installed at the "Mikroprovod" plant in Kishinev. It will save about 15-20% of the micro-wire and will reduce the number of workers in the testing shop."

32. Automation Equipment Offered From Open Stock

"Nal-chinskiy Zavod 'Tsvetmetpribor'"; Kaunass, Sovetskaya Litva, 12 Oct 62, p 4

An advertisement by the Nal'chik plant "Tsvetmetpribor" offers, from open stock, without a requisition order, the following control and automation equipment: remote weighing scale registers of DRV-NO6 type for type LT or "Gosmeter" conveyor scales; type ES-1011 electronic signaling devices and type DE-63 electrode transducers for automatic control of ore, concentrate, charge, or other poorly conducting material on a belt conveyor; type RVE-41, 127-v electronic time relay having an operating range of 1 to 100 sec and 90 to 200 sec; type RVE-1 electronic time relay having an operating range of 1 to 300 sec; type VSD-10 and VSS-12 stabilized selenium rectifiers for batteryless supply of dispatcher commutators in telephone exchange; type KV-24 combined rectifiers to supply power to telephone exchanges, for telemetering, etc.; equipment for acoustic signaling; and type SS-1 sirens.

33. Automation in Banks

"Electroni8 Helpers"; Leningrad, Leningradskaya Pravda,
22 Jul 62, p 2

Electronic machines soon will help the clerks in savings banks. Final adjustment of the prototype unit was completed yesterday at the Leningrad Experimentation Plant of the Construction-Technological Bureau for Computer Design. Engineers V. P. Kiselev and S. L. Chechurin are guiding the work on this complicated device.

Such an electronic helper is able to perform 48 various bookkeeping operations. The machine records deposits, computes interest, calculates balance, etc. A special device precludes any possibility of error. At any instant the machine can tell how much money has been deposited during the day, how much has been paid out in pensions, etc. Twenty such machines installed in different banks will feed information to a central regional bank.

The bureau is also designing the electronic machines "Ladoga," "Onega," and "Svir'" for various monetary manipulations.

34. Regenerative Hybrid Parametric Amplifier

"Superhigh-Frequency Parametric Diode Amplifier of the Regenerative Hybrid Type," by L. R. Grigolovich and E. I. Krupitskiy, USSR Patent, Class 21g, 13/17, No 140916, 20.09.61 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 8, Aug 62, p 8-7-196)

"A patent has been obtained for the design of a superhigh-frequency parametric diode amplifier made in the form of a coaxial resonator, similar to an H-shaped cavity, with a klystron located in the inner tube of the resonator and a diode in a stub which is placed close to the maximums of the electrical fields of the signal and pump. The shorting pistons must be placed at distances approximately $3/4\lambda$ and $1/4\lambda$ from the output discs of the klystron. Signal input and output are accomplished with the aid of coupling loops introduced through the pistons. The structural and electrical unification of the amplifier and oscillator (klystron) proper has the effect of simplifying construction, decreasing pumping power losses, and providing for one-hand tuning (tuning to a signal frequency ω_s automatically tunes the klystron to a frequency $2\omega_s$). At the same time, the power and efficiency of the amplifier increase as a result of the use of a coaxial resonator in place of the ordinary toroidal resonator."

35. Thyratron Frequency Divider Patented

"Thyratron Frequency Divider," by A. V. Donskoy and G. V. Ivenskiy, USSR Patent, Class 21d², 12/03; 21d², 12/03; 21d², 14/02, No 139719, 5.08.61 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 8, Aug 62, p 8-5-69)

"The circuit of a thyratron a-c frequency divider with an even division factor, consisting of two thytrons each connected in parallel through its own load resistance to the a-c source, is proposed. A parallel RC network is included in the cathode circuit of each thytratron to provide automatic negative grid bias. A similar RC network is found in the common cathode circuit of both thytrons. After one thytratron has been conducting for the course of a predetermined number of half-periods, it is quenched due to the voltage buildup in the cathode circuits; then, the other thytratron fires -- the cathode circuit of this thytratron has by this time discharged to a certain value, and the cycle is repeated. The output voltage is taken from between the anodes of both thytrons."

36. Recent Soviet Patents in Field of Instrument Design

"Class 42. Measuring Instruments and Apparatus"; Moscow, Byulleten' Izobreteniy, No 15, Aug 62, pp 38-45

Class 42b, 12₀₃. No 149230; by F. P. Denisov. Method for Measuring the Thickness, for Instance That of a Film.

Class 42c, 5₀₂. No 149232; by A. V. Spivak. Optical Quadrant.

Class 42c, 25₀₁. No 149233; by I. T. Shestopalov. Differential Inclinator.

Class 42c, 46₅₀. No 149235; by R. I. Stakhovskiy. Automatic Optimizer with n-Channels of Control.

Class 42d, 10. No 149236; by Ya. I. Grinya. Electronic Delay Unit.

Class 42h, 10₁₂. No 149240; by I. M. Epshteyn. Indicator for Sharp Focusing of Image.

Class 42m, 14. No 149257; by L. P. Afinogenov and V. G. Kolosov. Push-Pull Shift Register.

Class 42m, 14. No 149258; by V. S. Podlipenskiy. Magnetic Logical Device.

Class 42m, 14. No 149259; V. S. Podlipenskiy. Magnetic Logical Device.

Class 42m, 14. No 149260; V. S. Podlipenskiy. Magnetic Logical Device.

Class 42m, 14. No 149261; by S. A. Zlotnikov. Operating Memory Device.

Class 42m, 14. No 149262; by D. S. Zhilkin and Ya. A. Khetagurov. A Device for Finding Malfunctioning Units in an Electronic Digital Computer.

Class 42m, No 149263; by A. G. Pankratov. Electrodynamic Element for Multicolumn Recording of Binary Numbers.

Class 42m, 14. No 149264; by R. V. Smirnov and K. I. Kurbakov. A Method for Forming of Word Code in Machines Translating From One Language into Another.

Class 42m, 14. No 149266; by V. I. Usynin. Transforming Analyzer of Linear Differential Equations

Class 42m, No 149267. No 149267; by V. I. Karandasov and Ye. I. Onopriyenko. Single-Channel Automatic Electronic Meter of Time Shift of Random Correlated Signals.

Class 42m, 14. No 149268; by G. P. Zemtsov and M. S. Neyman. Bistable Amplitude Dynamic Trigger.

Class 42m, 15. No 149269; by Yu. I. Ivlichev. Pneumatic Accumulator.

Class 42m, 36. No 149270; by S. I. Gamrekeli. Device for Synthesis of Four-Link Mechanisms.

Materials

37. Dielectric Properties of Gold-Barium Layers," by Yu. V. Zubenko and I. L. Sokol'skaya, Leningrad State University imeni A. A. Zhdanov; Moscow, Radiotekhnika i Elektronika, Vol 7, No 9, S p 62, pp 1467-1473

The method of autoelectronic microscopy in a Mueller electron gun was used to investigate a Ba-Au₅ intermetallic compound formed by the atomized deposition of dosed quantities of barium and gold on a tungsten

point. The work function of the layers thus obtained was equal to 3.3 ev. Polarization phenomena and a change in work function were observed when the layers were heated in an electric field. The authors suggest that polarization is caused by a turning of the dipoles in the layers and assume that a BaAu₅ compound has significant polarizability and, possibly, a constant dipole moment. The following explanation of the change in work function is offered: a Ba-Au layer is semi-conducting, and its conductivity depends on its structure, which may change strongly upon reorientation of the dipoles in an external electric field. Simultaneously with the change in conductivity, the Debye-Hueckel screening radius x_0 also changes. Depending upon the ratio between x_0 and the thickness of the layer, the work function may vary between that of the substrate and that of the compact layer of the substance. Heating a Ba-Au layer in a direct field decreases conductivity and increases x_0 , while heating in a reverse field has the opposite effect.

This work was presented at the Tenth Conference on Cathode Electronics which was held from 23-30 November 1961 in Tashkent.

38. Specific Resistance of Metal Filaments Carrying High, Rapidly Pulsed Current

"The Resistance of Metals at High Current Density and Short Pulse Durations," by L. G. Dubitskiy; Moscow, Radiotekhnika i Elektronika, Vol 7, No 10, Oct 62, pp 1816-1823

Results are given of an experimental study of the dependence of the specific resistance of thin copper (99.93%) and silver (99.97%) filaments on the amount of energy introduced into them and the extent of their deformation, when current densities of over 500,000 amperes per square centimeter are pulsed through them.

It was found that a reduction of the pulse length below 2 microseconds is accompanied by a sharp increase in specific resistance. An even sharper increase with increased cold hardening is explained as a manifestation of electron inertia.

39. Fluctuation Energy of Ferrite in Ferromagnetic Resonance

"The Variable Emission of a Small Ferrite Specimen During Ferromagnetic Resonance," by Ya. A. Monosov; Moscow, Radio-tekhnika i Elektronika, Vol 7, No 10, Oct 62, pp 1730-1737

Since recent literature on the problem of designing low-noise microwave ferrite amplifiers fails to give enough attention to the noise characteristics of such amplifiers, which is a must for future development, this work is devoted to a theoretical study and estimation of the noises produced by a magnetized ferrite specimen in both infinite space and inside a resonator.

A solution is given of the problem of the thermal emission of a magnetized ferrite sphere, the radius of which is small compared with the wave length; the method of calculation is one developed earlier by S. M. Rytov (Teoriya Elektricheskikh Fluktyatsiy i Teplovogo Izlucheniya [The Theory of Electrical Fluctuations in Thermal Emission], Moscow, Academy of Sciences USSR, 1953). It is shown that the emission output is very low (of the proportion $(a/\lambda)^{2n+1}$, where n is the index of the type of oscillation is tuned into ferromagnetic resonance.

A calculation is made of the energy of the fluctuations of oscillations produced by the ferrite specimen in a resonator.

A. A. Pistol'kors and S. M. Rytov were consulted in this work.

40. Soviet Research in Polymer Semiconductors Reported

"Polymer Semiconductors"; Berlin, Die Technik No 10, Oct 62, p 736

Some time ago, Soviet research laboratories developed polymer semiconductors. For example, polyacrylonitrile (Orlon fiber) suddenly showed semiconductor characteristics after exposure to X rays. Similar characteristics were also observed in other plastics. Although development work has not yet been completed, scientists hope to be able to fabricate transistors and many other elements of semiconductor technology from plastics in the future. The basic raw materials for the manufacture of polymer semiconductors, namely products of petroleum and natural gas processing, are available in virtually unlimited quantities and are, therefore, relatively inexpensive. Furthermore, fabrication of individual elements from plastics might be simpler than, say, fabrication of germanium transistors.

Patents

41. Recent Soviet Patents in Field of Electronics

"Class 21. Electrical Engineering"; Moscow, Byulleten' Izobreteniy, No 14, Jul 62, pp 21-28

Class 21a², 18₀₈. No 148822; by B. N. Ivanchuk and B. Ya. Rubinov. Push-Pull Magnetic Amplifier.

Class 21a², 18₀₈. No 148823; by Ya. M. Kleyman. Three-Phase Push-Pull Magnetic Amplifier.

Class 21a², 18₀₈. No 148824; by B. N. Ivanchuk, B. Ya. Rubinov, and R. A. Lipman. Three-Phase Voltage Regulator.

Class 21a⁴, 71. No 148825; by A. Ye. Reznikov. Method for Taking Directivity Patterns of Acoustic Wave Receivers.

Class 21c, 46₀₅. No 148831; by D. R. Kritskiy and I. A. Stremenov. Method for Control of Program Entry to Machine Tools With Programed Control With the Aid of Perforated Tape.

Class 21c, 46₅₀. No 148832; by A. M. Yerkin. Device for Automatic Control.

Class 21c, 54₀₁. No 148834; by L. M. Kiselev. Voltage Divider.

Class 21c, 63₀₄. No 148836; by B. K. Karpenko. Amplifying Device.

Class 21c, 65₀₅. No 148838; by V. V. Kantan. Analog Computer for Calculating the Most Efficient Reactive Loads of Electric Stations and Synchronous Converters of the Networks

Class 21d¹, 41. No 148841; by F. M. Akhundov. Electrodynamic Transmission.

Class 21d², 12₀₃. No 148845; by P. A. Mayevskiy. Grid Pulse Generator for Control of Rectifier Installations.

Class 21d², 14₀₁. No 148846; by G. Ye. Petukhov, M. S. Mikhaylov-Mikulinskiy, G. N. Petrov, and A. I. Abramov. Asynchronous Frequency Converter.

Class 21e, 2₀₃. No 148851; by M. I. Belyy and N. P. Makarov. Ferrodynamic Self-Recording Ratiometer.

"Class 21. Electrical Engineering"; Moscow, Elektrosvyaz',
No 9, Sept 62, pp 73-74

Class 21a, 8₀₂. No 145902; by A. L. Skripko. Method for Automatic
Tuning of Resonance Circuits and Device for Accomplishing This.

Class 21a¹, 34₁₁. No 145619; by K. S. Korneyevets. Method of Automatic
Image Focusing.

Class 21a¹, 36. No 145623; by I. R. Pekar'. High Voltage Pulse
Generator.

Class 21a², 18₀₈. No 145255; by L. N. Kiselev. Semiconductor Magnetic-
Transistor Reversible Pulse Amplifier.

Class 21a², 18₀₈. No 145256; by B. N. Invanchuk and B. Ya. Rubinov.
Three-Phase Magnetic Amplifier With Positive Feedback.

Class 21a², 18₀₈. No 145627; by Ye. I. Shushkov. Pulse Duration
Measuring Device.

Class 21a², 18₀₈. No 145628; by A. V. Kucheryavenko. Negative Pulse
Amplifier-Adder.

Class 21a², 18₀₈. No 145908; by Mering Rol'f (German Democratic Re-
public). Radiation Indicator.

Class 21a⁴, 10. No 145629; by S. S. Kogan and A. S. Stepanov.
Magnetostrictive Resonator.

Class 21a⁴, 29₀₁. No 145630; by S. A. Shkabara. Method of
Stabilizing the Amplitude and Phase-Frequency Characteristics of a
Wide-Band Resonance Amplifier.

Class 21a⁴, 29₀₂. No 145631; by A. K. Lidikh. Method of Compensating
for Strong Pulse Interference.

Class 21a⁴, 71. No 145637; by L. A. Pereslegin. Multichannel
Analyzer of Random Processes.

Class 21c, 46₅₀. No 145646; by V. I. Kostyuk. Self-Adjusting
Servo System.

Class 21d², 12₀₃. No 145276; by B. L. Huang-Ts'o-Li. Static
Semiconductor Converter.

C-O-N-F-I-D-E-N-T-I-A-L

Class 2ld², 12₀₃. No 145927; by N. N. Laptev. DC-to-Three Phase AC Converter.

Class 2lg, 11₀₂. No 145665; by M. N. Zargar'yants, V. S. Popov, and I. I. Taubkin. Device for Measuring the Depth of P-N Junctions.

Class 2lg, 13₁₇. No 145284; by M. Ye. Zhabotinskiy and V. V. Grigor'yants. Molecular Oscillator-Amplifier.

Radio Astronomy42. Improved Digital Coordinate Transformer for Radio Telescope Tracking

"On the Possibility of Constructing a More Accurate Coordinate Transformer for a Radio Telescope Tracking System," by G. G. Basistov, Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR; Gor'kiy, Izvestiya VUZ, Radiofizika, Vol 5, No 4, 1962, pp 640-643

For radio telescope tracking systems, a coordinate transformer is considered which is based on a combination of digital integrators, the integrated discrete elements being used to design the programmed device which should guarantee an accuracy of 0.1-0.2 minute for a radio telescope tracking system in tracking radio stars and the planets. An estimate is given of the complexity of the computing system and of the influence of that part of the computing circuitry involved in the tracking system on the stability of the tracking system.

The article was one of the reports delivered at the expanded plenum of the Commission on Radio Astronomy of the Astronomical Council, Academy of Sciences USSR, held in Moscow in 1960

43. Reduction of Systematic Error in Radio Astronomy by Computer

"Reduction in Radio Astronomy by Approximation Methods," by A. Balklav, Astrophysical Laboratory, Academy of Sciences Latvian SSR; Gor'kiy, Izvestiya VUZ, Radiofizika, Vol 5, No 4, 1962, pp 629-639

Three approximation methods (method of finite differences, method of equidistant points, and method of derivatives) are considered for eliminating the systematic error of radiotelescope observations. A block diagram of a computer arrangement for automatic solution of the problem by reduction is illustrated.

44. Radio-Astronomy Method of Calibrating Small Antennas for Decimeter Wave Lengths

"The Use of the Absolute Radio-Astronomy Method of Calibrating Small Antenna Systems For Centimeter Wave Lengths," by V. S. Troitskiy and N. M. Tseytlin, Scientific-Research Radio Physics Institute, Gor'kiy Universitiy; Gor'kiy, Izvestiya VUZ, Radiofizika, Vol 5, No 4, 1962, pp 623-628

A method is suggested for measuring the parameters of antennas at centimeter wave lengths according to the standard radiation of a black disk with small angular dimensions. Tabulated data for short towers and small disks show that, at decimeter wave lengths with a 50-70 meter tower topped with a 4-meter disk, it is possible to measure the antenna gain and scatter for apertures of up to 15-20 meters (a 10°K -increment of antenna temperature can be measured satisfactorily with available radiometers). Antennas with larger apertures at decimeter wave lengths can be calibrated satisfactorily if the radio emanation of the moon is used as a black disk (angular dimensions 30 minutes, temperature $220\text{-}250^{\circ}\text{K}$, anticipated antenna temperature increment at 50-centimeters wave length, and 25-meter antenna aperture being approximately 10°K). The moon, in turn, should be standardized with a 15-20 meter antenna and standard disk.

To check the possibility that the disk might be positioned at a distance from the antenna less than d^2/λ , a measurement was made of the value $(1 - \beta\Delta)$ ($\beta\Delta$ being the antenna scattering factor outside the solid angle of the disk) of the antenna with $d = 1.5$ meters at a wave length of 3.2 cm ($d^2/\lambda = 70$ m) using a disk diameter of 26 cm, the disk being 28 meters ($d^2/2.5$) from the antenna (32-minute angular dimension of disk). The value $(1 - \beta\Delta)$ in this case was only 2-3 percent greater than that measured with the 4.4-meter disk located at a distance of 472 meters (about $7 d^2/\lambda$).

Telemetry45. Trigger Properties of Nonlinear Wave Guide Systems

"On the Trigger Properties of Nonlinear Wave Guide Systems," by S. A. Akhmanov and R. V. Khokhov, Moscow State University; Gor'kiy, Izvestiy VUZ, Radio fizika, Vol 5, No 4, 1962, pp 742-745

A space-time analogy is considered between the process of wave propagation in a wave guide system with nonlinear capacitance and the establishment (with respect to time) of oscillations at parametric resonance. The possibility is shown of the existence of space analogs of dynamic triggers with lumped constants based on nonlinear lines with nonlinear reactance and

nonlinear active impedance. The advantages of such wave guide systems are the possibility of a considerable reduction of the time spent on one bit of information, and the circumstance that the wave guide systems are four-terminal networks.

An important question for systems of the type considered here is that of self-induced transitions from one stable state into another under the effect of internal interferences. An earlier work of the authors (Radiotekhnika i Elektronika Vol 6, 1961, p 1813) showed that, in the usual case, such transitions are quite rare, but that the method used can also apply to the problem of the shifting of wave guide triggers from one stable state to another as a result of external forces.

Wave Propagation and Antennas

46. Surface Wave Power in a Metal Cylinder With Dielectric

"Power Carried by a Surface Wave Along a Metal Cylinder With a Dielectric Coating," by M. S. Bobrovnikov, G. V. Grozin, and B. A. Red'kin, Tr. Sibirsk. fiz.-tekhn. in-ta pri Tomskom un-te (Works of the Siberian Physicotechnical Institute Under Tomsk University, No 39, 1960, pp 37-45 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 8, Aug 62, p 8-7-137))

"The authors investigate the transmission of superhigh-frequency electromagnetic energy along an infinitely long metal cylinder covered with a dielectric layer. The case in which the radius of the cylinder is of the same order as the wave length or somewhat less is considered. The power which is transmitted within and outside the dielectric coating is computed. The authors determine the conditions when the transmitted power at which a breakdown occurs will be minimum. The temperature to which the dielectric is heated is also computed. Experimental data are given on tests of a single-conductor line for electrical strength when pulse power is transmitted at a wave length of 10 cm."

47. Wave Propagation in Nonhomogeneous Medium

"On the Mutual Correlation Function of the Amplitude- and Phase Fluctuations of a Wave Propagated in a Nonhomogeneous Medium," by Yu. A. Ryzhov; Moscow, Radiotekhnika i Elektronika, Vol 7, No 10, Oct 62, pp 1824-1825

Among the many problems involved in the propagation of radio waves in a nonhomogeneous medium is that of establishing the mutual correlation function for the fluctuations of the level and phase of the wave after

passing through a nonhomogeneous layer, particularly in the case of a calculation of the fluctuations of intensity in the focal planes of lenses and antennas, upon which a plane wave impinges which has passed through a turbulent layer of the atmosphere.

L. A. Chernov (Rasprostraneniye Voln v Srede So Sluchaynymi Neodnorodnostyami [Wave Propagation in a Medium With Random Inhomogeneities], Academy of Sciences USSR, 1958) solved the problem of the correlation of the fluctuations of level and phase for a correlation function of the index of refraction $B_n(P) \sim \exp(-P^2/a^2)$.

This brief report gives the formulas for the mutual correlation function for the fluctuations of level and phase of a plane wave for the case of a local-homogeneous and isotropic turbulence.

48. Distortion Effects on Nanosecond Pulses in Wave Guide

"On the Probability of the Distortion of Pulse-Code-Modulated Signals Produced by Some Nongaussian Noises," by R. F. Matveyev; Moscow, Radiotekhnika i Elektronika, Vol 7, No 10, Oct 62, pp 1703-1710

Pulse-code-modulated nanosecond pulses conveying information in a wave guide line become considerably distorted as a result of dispersion. Within certain limitations, the probability conditions are established here for an erratic reproduction of signals in the oscillator as a result of the total influence of gaussian noise and the dispersed distortions of pulses.

The effect of processes occurring in the synchronization channel of the oscillator are ignored.

The calculation of the probability density here is considered to be more precise than that arrived at by E. A. Marcatili ("Errors in Detection of RF Pulses Embedded in Time Crosstalk, Frequency Crosstalk, and Noise," Bell System Technical Journal, Vol 40, No 3, 1961) in a similar treatment of random values.

49. Field Fluctuations of Direct and Reflected Microwave Signals in Troposphere

"A Comparison of the Statistical Characteristics of the Fluctuations of the Field of Direct and Reflected Microwave Signals in the Troposphere," by T. I. Arsen'yan and A. A. Semenov, Physics Faculty, Moscow State University; Moscow, Radiotekhnika i Elektronika, Vol 7, No 10, Oct 62, pp 1699-1702

Some experimental results are given of a comparison of the statistical characteristics of the field fluctuations of direct and reflected microwave signals under identical and analogous conditions of propagation. It is shown that the time autocorrelation functions of the fluctuations of the two types of signals are the same. The spatial autocorrelation functions were investigated by means of oscillations which were analogous in both types of signals. The experimental results are compared with theoretical results of a spatial correlation for the partial case of the correlation function of the fluctuations of the index of refraction of a medium with gaussian distribution.

50. Transmission of Radio Waves Through Gas Pipelines

"Radio Wave Transmitted by Gas Pipeline," by R. Svoren'; Riga, Sovetskaya Latvija, 13 Jul 62, p 4

Soviet radio engineer Yuriy Kaznacheyev of the Radio Engineering and Electronics Institute Academy of Sciences USSR is now studying the possibility of utilizing gas pipelines as wave guides for transmission of radio waves. For this purpose, the inner surface of the gas pipe must be lined with a thin layer of copper or aluminum. Such wave guide pipeline can transmit up to 100,000 simultaneous telephone conversations if operated on centimeter waves.

It is believed that practical realization of such transmission line is near.

51. Forecasting Critical Frequencies of F₂ Layer

"Long-Range Forecasting of Maximum and Minimum Critical Frequencies of the F₂ Layer," by A. I. Likhacheb, Tr. Sibirsk. fiz.-tekhn. in-ta pri Tomskom un-te (Works of the Siberian Physioelectrical Institute under Tomsk University), No 38, 1960, pp 47-56 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 8, Aug 62, item 8Zh223)

"Based on an investigation of the relationship between median values of critical frequencies during midday and morning hours and establishment of the natural pattern of change of this ratio relative to solar activity, as well as an investigation of the behavior of the solar component of F₂ layer ionization relative to solar activity and the zenith angle, a method is given for determining the minimum and maximum median values of critical frequencies for a given point according to data of solar activity predictions. An example is given of forecasts for the Tomsk area, and forecast data are compared with experimental data for the 18th cycle of solar activity."

52. Radio Wave Absorption in Ionosphere

"Measurements of Radio Wave Absorption in the Ionosphere," by B. A. Grokhotova, Tr. Sibirsk. fiz.-tekhn. in-ta pri Tomskom un-te (Works of the Siberian Physiocotechnic Institute Under Tomsk University), No 38, 1960, pp 15-22 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 8, Aug 62, item 8Zh193)

"Data are presented on measurements of the absorption factor of radio waves in the ionosphere obtained in Tomsk in 1959. Measurements were made by the pulse method. For daylight hours, the absorption factor L was computed from the formula: $L = 20 \lg G - 20 \lg(A_1 h')$, where A_1 is the amplitude of the reflected signal, h' is the height of the reflecting layer, and G is the calibration constant; and for night hours the following formula was used: $L = 20 \lg p$, where p is the reflection factor for the layer. Data on the measurements are presented in tabular form. It was seen that during 1959, 82% of the daily meridional values of L for a frequency $f_1 = (2.2 \pm 0.2)$ Mc fluctuated within limits of 20 to 40 db, and 80% of the daily meridional values of L for a frequency $f_2 = (3.0 \pm 0.3)$ Mc were within limits of 10 to 30 db. The daily variation of values of L when averaged over world days roughly corresponded for April to $(\cos_X)^{1/2}$ and for March to \cos_X ."

53. High-Frequency Permittivity of a Nonisothermic Plasma

"On the High-Frequency Permittivity of a Nonisothermic Plasma," by Ye. Ye. Lovetskiy, Moscow Engineering Physics Institute; Gor'kiy, Izvestiya VUZ, Radiofizika, Vol 5, No 4, 1962, pp 813-814

Utilizing both the consultation and an earlier work of V. P. Silin (Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 41, 1961, p 861), in which an expression was obtained for the complex permittivity of a completely evacuated (isothermic) plasma in a frequency range considerably higher than the Langmuir frequency of the electrons, the author considers here the high-frequency ~~permittivity of a~~ nonisothermic plasma in which the electron temperature is greater than the ion temperature, with particular attention paid to the region in which the variable frequency is considerably higher than the Langmuir electron frequency.

54. Interaction of Electromagnetic Waves With Moving Interface

"The Interaction of Electromagnetic Waves and the Moving Interface of Two Media," by S. N. Stolyarov, Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR; Gor'kiy, Izvestiya VUZ, Radiofizika, Vol 5, No 4, 1962, pp 671-678

In a study of several interesting peculiarities of the interaction of electromagnetic waves and a moving interface of two media, it is shown that certain effects prove to be linear with respect to the velocity (assumed to be constant) of the interface. The results of this work are considered useful in the study of the interaction of electromagnetic waves and moving objects, such as plasma concentrations or beams of relativistic particles in physics; and the shells of supernovae, in astronomy.

The work was assigned and supervised by B. M. Bolotovskiy, and consultation was given the author by V. L. Ginsburg.

55. Plasma-to-Electromagnetic Wave Transformation in Isotropic Plasma

"On the Transformation of Plasma Waves Into Electromagnetic Waves in a Heterogeneous Isotropic Plasma," by V. V. Zheleznyakov and Ye. Ya. Zlotnik, Scientific-Research Radiophysics Institute, Gor'kiy University; Gor'kiy, Izvestiya VUZ, Radiofizika, Vol 5, No 4, 1962, pp 644-657

The transformation of plasma waves into electromagnetic radiation is considered for a stationary isotropic plane-stratified plasma. The efficiency of the wave transformation is calculated, and the limits of applicability of the solution obtained by a perturbation method are estimated.

From expressions obtained by the author, it is evident that the maximum possible coefficient of transformation, in the case in which the wave length of the plasma wave is considerably less than the characteristic heterogeneity of density or temperature, is considerably less than unity, i.e., considerably below a value which would permit wave interaction in the layer in question. It is shown that an effective transformation is possible only for those plasma waves which are distributed within a narrow cone, the angle of which differs from that obtained by D. A. Tidman (Physical Review, Vol 117, 1960, p 366) in a geometrical-optical approximation in the presence of a temperature and density gradient.

56. Electromagnetic Wave Interaction in Three-Level Gaseous Systems

"On the Interaction of Electromagnetic Oscillations in Three-Level Systems," by V. M. Fayn, Ya. I. Khanin and E. G. Yashchin, Scientific-Research Radiophysics Institute, Gor'kiy University; Gor'kiy, Izvestiya VUZ, Radiofizika, Vol 5, No 4, 1962, pp 697-713

An investigation is made of the possibility of utilizing the nonlinear properties of three-level quantum mechanical systems to transform the frequencies of electromagnetic oscillations in the optical and radio ranges. To describe the processes which occur in multilevel gaseous systems, the authors derive an equation for the density matrix, with molecular velocity taken into account. Through a simultaneous solution of the density matrix equation and the Maxwell equations, an expression is obtained for the coefficient of transformation of a three-level mixer; this coefficient reaches extremely high (theoretically infinite) values, if regeneration occurs at one of these frequencies (signal or combined).

A calculation is also made of the intensity of the radiation in free space at a transformed frequency within the optical range, when the dimensions of the three-level system are considerably greater than the wave length.

57. Interaction of Electromagnetic Waves and Electron Beam in Rectangular Wave Guide

"On the Problem of the Interaction of Electromagnetic Waves and an Electron Beam Directed by a Periodic DC Field," by M. I. Petelin, Scientific-Research Radiophysics Institute, Gor'kiy University; Gor'kiy, Izvestiya VUZ, Radiofizika, Vol 5, No 4, 1962, pp 736-741

The propagation of electromagnetic waves is considered in a wave guide pierced by a curved electron beam directed by an electrical or magnetic DC field which changes periodically along the wave guide and has a rectangular

cross sectional configuration. The limitations of the kinetic equation method used here considerably reduce the area of applicability of the obtained calculations for real systems, but the method itself can be used in the consideration of much more complex models of electronic devices. A method of integrating the kinetic equation in Lagrange variables was used (V. D. Shafranov, Fizika Plazmy i Problemy Upravlyayemykh Termoyadernykh Reaktsiy [Plasma Physics in the Problem of Controlled Thermonuclear Reactions], No 4, 1958, Moscow, Academy of Sciences USSR, p 416) to find the permittivity tensor of a homogeneous plasma, the components of which have distribution functions independent of time in the zero approximation. It is shown here also that this method can be used in the case in which the distribution of particles is both heterogeneous and nonsteady-state.

The work was supervised by A. V. Gaponov.

58. Molecular Generator for Four-Millimeter Range

"Molecular Generator Based on a Beam of Formaldehyde Molecules in the Four-Millimeter Range," by A. F. Krupnov and V. A. Skvortsov, Scientific-Research Radiophysics Institute, Gor'kiy University; Gor'kiy, Izvestiya VUZ, Radiofizika, Vol 5, No 5, 1962, p 820

A molecular generator which operates on the $101-0_{00}$ transition of the CH_2O molecule was devised and put into operation. It was designed along the general lines of a beam maser using a resonator at the E_{010} mode on the basis of an installation described earlier by the authors (Izvestiya VUZ, Radiofizika, Vol 5, 1962, p 611). A superheterodyne receiver was used for the study, the heterodyne klystron being stabilized by a volume resonator; the signal used was the tenth harmonic of a quartz-stabilized, 3-cm klystron.

59. Wide-Band Cophasal Antenna

"Double-Row Wide-Band Short-Wave Cophasal Antenna With Aperiodic Reflector," by L. K. Olifin and K. A. Tarasova; Moscow, Radiotekhnika, No 9, Sep 62, pp 7-14

The present work is concerned with the design of a two-row cophasal antenna with an aperiodic reflector, being a continuation of work previously carried out at the Scientific Research Institute of the Ministry of Communications.

The new antenna was designated as SGD $\frac{2}{4}$ RA and has a spacing of $0.5\lambda_0$ (where λ_0 is the optimal wave) between the rows and a spacing of $0.27\lambda_0$ between the antenna and the reflector. The aperiodic reflector is in the form of a grid made with horizontal wires.

Two variants of the SGD $\frac{2}{4}$ RA antennas were investigated with spacing of λ_0 and $1.5\lambda_0$ between the antenna sections. To ensure antenna operation in a wide-band range, the dipoles were selected with low wave impedance.

In the first variant of the antenna, the wave impedance of the dipole was 470 ohms; and the dipole was made of three 4-6 mm wires placed at the vertices of an equilateral triangle with sides equal to $0.0352\lambda_0$. The length of the symmetrical dipole is $0.82\lambda_0$. At the feed point, the wires of the dipole converge forming a cone with an altitude of $0.02\lambda_0$.

In the second variant, a dipole with wave impedance of 350 ohms is used. The dipole is made of four 4-6 mm wires placed at the vertices of a square with sides equal to $0.065\lambda_0$. At the point of feed, the wires converge to form a cone with an altitude of $0.09\lambda_0$.

The study of this type of antenna showed that the spacing between the centers of the sections should be about λ_0 . An increase in spacing to $1.5\lambda_0$ results in some increase of antenna gain; however, this also narrows the antenna band-width.

Both variants of the SGD $\frac{2}{4}$ RA antenna have good directivity on all waves from $0.75\lambda_0$ and longer. Matching of the antenna with the feeder line is good for a wide range of frequencies. The traveling wave ratio of the antenna varies from 0.5 to 0.3 for the wave length range from 0.75 to $2.17\lambda_0$.

Both antenna variants permit antenna directivity control in the horizontal plane.

60. Surface-Wave Antennas

"Experimental Investigation of Surface-Wave Antennas Emitting a Field by Transverse Curvature of Wave Guides," by V. G. Voropayeva, Moscow Aviation Institute imeni Sergo Ordzhonikidze; Kiev, Izvestiya Vysshikh Uchebnykh Zavedeniy, Radiotekhnika, No 3, May/Jun 62, pp 314-320

This new class of surface-wave antennas was first suggested by M. S. Neyman and consists of rectangular dielectric surfaces applied to a curved metal sheet. Such antennas may have different directivity patterns, depending on the curvature of the sheet.

The author believes that no experimental data on such antennas have been reported in the open literature.

In this investigation, the surface waves were excited with the aid of rectangular paraffin strips bent in the plane of a metal sheet. The investigation was conducted on a 3.2 cm wave with a 23 X 10-mm rectangular metal wave guide.

The investigation showed that the width of the major lobe in the vertical plane at half power was about 90° . The width of the major lobe in the horizontal plane varied from 18° to 30° , depending on the radius and angle of the bend.

In conclusion, the author states that the aim of this investigation was merely to prove the feasibility of such an antenna, not to study in detail all of their parameters.

61. Scalar Wave Fields Above Plane With Nonuniform Surface Impedance

"The Field Above a Plane With Nonuniform Surface Impedance,"
by V. I. Talanov, Scientific-Research Radiophysics Institute,
Gor'kiy University; Gor'kiy, Izvestiya VUZ, Radiofizika, Vol 5,
No 4, 1962, pp 721-735

The method of integral equations was used to study a scalar wave field above a plane with nonuniform surface impedance. The problem considered here is that of the reflection of waves from a plane, the surface impedance of which is described by a linear-rational (in a special case, by a linear) function of coordinates. Directivity diagrams are computed for a point source positioned above a plane with such an impedance.

The study of the field of such sources above a surface with nonuniform surface impedance leads to the following conclusions:

1. The field above the plane with nonuniform impedance represents, generally speaking, the sum of the space wave and the surface field located near the plane. The contribution of the latter, in the general case, is particularly noteworthy in the regions with positive impedance.

2. The surface fields play a considerable role in the plotting of the directivity diagrams of sources located near the plane with nonuniform impedance. These fields condition particularly the directional character of the radiation of an isotropic radiator position above a plane with a surface impedance which is positive, but steadily decreases to zero.

The results of this work were reported at the Scientific Session of the Scientific-Technical Society held in Moscow in 1958.

62. On Possibility of Antennas With Linear Scanning

"Frequency Oscillation of a Beam in Antenna Arrays," by B. A. Yegorychev, Tr. Mosk. fiz-tekhn. in-ta (Works of the Moscow Physicotechnical Institute), No 8, 1962, pp 67-72 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 8, Aug 62, item 8Zh122)

"The author presents a brief theory of frequency oscillation of an antenna beam, showing the possibility, in principle, of constructing antennas with linear and two-dimensional scanning. Formulas are given for making engineering calculations of the parameters of linear and two-dimensional arrays for a given scan sector, the number of scan lines, width of the pattern, and frequency deviation."

63. Transmission Factor of Energy Transfer in Crossed Wave Guides

"The Transmission of Energy in Crossed Wave Guides by Means of a Magnetized Ferrite," by A. L. Mikaelyan and M. M. Koblova; Moscow, Radiotekhnika i Elektronika, Vol 7, No 10, pp 1835-1838

For the case of crossed wave guides with a magnetized ferrite sphere at the junction, the transmission factor for the transmission of energy from one wave guide into the other is solved here by means of a method which can also be used to compute the energy conditions in a number of other wave guide cross in the H-plane with transverse magnetized ferrite in the center).

The work was supervised by A. A. Pistol'kors.

III. ENGINEERING

Computers, Automatic Control Engineering64. Superiority of Human Brain Over Computer, or Vice Versa, Cannot Be Proved

"Algorithms and the Possibilities of Cybernetics," by
S. M. Shalyutin, Kurgan; Moscow, Voprosy Filosofii, No 6,
1962, pp 163-170

In a critical analysis of the attempt to describe mathematically the assumed superiority of the human brain over a machine in the processing of information -- generally based on the inductive, "creative" thinking of the brain as processes for which no algorithms exists, or perhaps cannot be found -- it is concluded that the stage of development of modern mathematical logic is not sufficiently advanced to provide confirmation. Modern physics uses, to describe processes of nature, a classical, set-theoretic mathematics, and no proof has yet been given that it has been completely replaced by constructive (machine-method) tendencies; if such is the case, however, the possibility cannot be excluded of the modeling of nonconstructive methods by specific physical processes, a matter deserving investigation. A machine might solve even "algorithmically insoluble" problems, if specific discrete steps (the basis of the algorithm) could be modeled physically, which means that the algorithm of machine operation would be an algorithm of reducibility, whereby the machine would reduce a given problem to a solution of another algorithmically insoluble, but physically modelable problem.

65. Strela Finds Shortest Routes

"Fast and Precise Dispatcher Aids"; Moscow, Izvestiya, 10 Oct 62

A "Strela" electronic computer was given an assignment to determine the shortest routes for transporting goods from four Moscow bakeries to 650 stores in the capitol. The assignment was completed in several seconds, and the new routes turned out to be 6.7% more economical.

66. Pneumatic Computer

"Pneumatic Computer"; Moscow, Pravda, 10 Oct 62, p 4

Engineers of the Khar'kov Teploavtomat plant, together with scientists, are building a pneumatic computer. In one of the laboratories, various models of its components, circuits, and other details can now be seen. The assistant to the chief engineer of the plant, V. M. Gorokhov, told a Tass correspondent:

"The new machine undoubtedly has a great future. Slow technological processes in chemistry, thermal engineering, and other branches of the national economy can be easily simulated by it. In other words, under laboratory conditions it will be possible beforehand to reproduce and test the operation of thermal ovens, steam boilers in power plants, and other large units.

"The simulation of such processes is considerably easier and simpler on pneumatic than on electronic computers. Later on, this will allow, with a minimum of effort, a wider application of automation to the control of production.

"Right now, a mock-up of the main assembly of the machine is being built. Another important part of the equipment -- the unique two-point register -- has been tested and is ready. This instrument guarantees automatic and simultaneous measurement and recording of two quantities -- the intake and exhaust pressures of the air in the machine."

67. Cybernetics Machine Designed

"New Cybernetics Machine"; Moscow, Moskovskaya Pravda, 4 Oct 62

Soviet scientists have created the design of a new cybernetics machine to study economic, sociological, and biological problems.

Mathematician M. Tsetlin, one of the authors, made this known at the International Symposium on Relay Instruments and Automata, which was held in Moscow.

The theoretical development of the machine is an attempt to approximate the mathematical theory of games to a real life situation.

68. High Waters Predicted by Machine

"Machine Warns of Floods"; Leningrad, Leningradskaya Pravda, 4 Sep 62, p 4

Leningrad has been subjected from time to time to floods. Under certain climatic conditions, the waters of the Gulf of Finland rush into the Neva, over flowing its banks. Scientists of the Institute of Oceanography turned to the computing center of the Mathematical Institute imeni Steklov with a request to find a mathematical method of forecasting floods.

With the aid of high-speed electronic computer, mathematicians were able to solve this problem. They tested their method of predicting on data of floods occurring in 1955 and obtained figures very close to the actual ones. Now the BESM-2 machine, in only 10 minutes, can give a prediction 6-8 hours in advance.

69. Programers Needed!

"--- Electronic Equipment Into the Hands of the Engineers,"
by Yu. Fominykh, engineer; Moscow, Izvestiya, 3 Oct 62, p 4

The author discusses the lack of competent programers for electronic computers. Even graduates of engineering and scientific schools have not been adequately trained in this field and, as a result, do not know how to use the machines for computing. Two reasons are given for this: (1) the time required for training in programing -- 40 to 60 hours -- and (2) the substitution of the study of computer construction for instruction in programing itself.

The author considers the latter the main reason for the lack of programers. He places the blame on the Ministry of Higher and Secondary Specialized Education of the USSR, which shows a preference for such theoretical courses as the technical principles and arithmetic bases of electronic digital computers. Frequently, courses in computers given by institutions of higher learning are taken by electronics specialists but not by mathematicians, and as a result only the former know how to use the machines for computing.

To remedy this situation, the author concludes that courses in programing should be made compulsory in institutions of higher learning.

70. More Efficient Use of Computers Needed

"A Full-Time Job for Accounting Techniques," by I. Pinegin,
chief of the Department of Mechanized Accounting, Central
Statistical Administration of the Moldavian SSR; Kishinev,
Sovetskaya Moldaviya, 7 Sep 62, p 3

A great increase in the production of accounting machines and computers is foreseen for the Seven-Year Plan of 1959-1965, made necessary by the mechanization of the work of engineers and technicians in the field of administration. In the Council of National Economy and the ministries and departments of the Moldavian SSR, the number of mechanized organizations for promoting efficiency and eliminating waste and duplication increased from 66 in January 1961 to 201 in July 1962.

Progress along these lines is slow. Many industries require unification. A check has shown that the most efficient use of machines is not being made. As an example, adding and computing machines at the accounting office of the Kishinev leather factory are used on an average of only 2 hours per 24-hour period.

One of the reasons for the poor use of accounting techniques is the lack of standard operating procedures in the mechanization of accounting. There is a need to organize a project group for mechanized accounting in economic planning and construction work in the Council of National Planning, where most of the accounting equipment is concentrated.

Mechanized accounting is especially important on state and collective farms for increased production; however, the same problems exist in engineering and manufacturing, but they are more complex. In each project organization, a special group should be set up for the mechanization of accounting, comprised of engineers and technicians familiar with the use of accounting machines. This work should be concentrated in one organization made up of qualified engineers, technicians, operators, and mechanics.

71. Armenian-to-Russian Translation by Machine

"Translates in 40 Seconds," by R. Meliksetyan; Yerevan, Kommunist, 20 Sep 62, p 3

A machine which will translate from Armenian into Russian is described. It belongs to the mathematical linguistics and machine translation section of the computing center of the Academy of Sciences Armenian SSR.

According to the director of the section, V. M. Grigoryan, whenever there is something to be translated, the machine first "'learns' and 'remembers' the grammar of the Armenian language." Then, after the "passage of sometime, the 'lesson' is completed, and the machine goes to work."

For the translation of a given passage, the text is first numerically coded on punched cards and then put onto tape. A special 'dictionary' of the most commonly used words has been compiled which, so far, consists of about 2,000 words. Grigoryan describes the sequence of operations:

"First of all, the text is coded with the aid of the dictionary. Then the punched cards are converted to tape.... Each group of symbols corresponds to a word or mark of punctuation. Finally, the electronic computer translates the text and decodes it." The average speed of translation is 40 seconds per sentence.

72. Automation in Oil Fields

"Oil Production Administration"; Moscow, Sovetskaya Rossiya, 27 Sept 62, p 4

The oil production administration Tuymazaneft' is introducing automation on a wide scale in its enterprises. A special installation permits control and regulation of all equipment from a centralized dispatcher center. This permitted transition from three-shift operation to two- or one-shift operation, thus reducing stand-by personnel and increasing oil production.

73. Remote Control Traction Substations

"Telemetry? That's Good," by P. Viktorov; Minsk, Sovetskaya Belorussiya, 27 Sep 62, p 4

The city of Gomel' now has two remote control traction substations, and in 1963 two more such stations will be added. The new substations are being designed by the "Belgosproyekt."

The introduction of remote control in city electric transport will result in great economy and reliability of operation.

74. All-Electronic And-Or Relay Action

"On the Synthesis of Contactless Circuits for an And-Or Relay Type Action," by V. G. Lazarev, Moscow, Problemy Peredachi Informatsii (Problems of the Transmission of Information - a collection of articles), No 9, 1961, pp 144-149 (from Referativnyy Zhurnal--Avtomatika i Radioelektronika, No 5, 1962, 5-2-124 a)

A study is made of the synthesis of single-action, two-stage circuits based on all-electronic (contactless) OR and AND-sections (the AND-section at output), which corresponds to a function recorded in a conjunctive normal medium. For the synthesis, the function is described by a set of necessary and conditional "pseudonumbers," i.e., the sums of the weights of those variables of the constituent of the zero expansion which, in a given constituent, have no negatives. A method is given for the conversion to the pseudonumbers, and a method of simplifying the procedure by using tables of adjacent constituents is described.

Examples are given for the synthesis of AND-OR (OR-AND) circuits.

75. Computer Installation for Synthesizing Relay-Contact Circuits

"Basic Design of an Electronic Machine for Synthesizing Relay-Contact Circuits," by V. Gl Lazarev, O. A. Oganov, and V. N. Roginskiy, Moscow, Problemy Peredachi Informatsii (Problems of Transmitting Information - a collection of articles), No 8, 1961, pp 5-19 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 5, 1962, 5-2-125 t)

Design principles are discussed for an electronic computer installation used for the synthesis of relay contact circuits. The equipment includes a switching panel for instructions, a generator made up of constituents, a base

commutator for obtaining circuit variations, sections for determining the realizability of certain conditions and of introducing intermediate relays, an amplifier with shift register and matrices of necessary and forbidden numbers, the computing and programing devices, output sections indicating the results of instructions, optimal-selection section, and print-out.

The installation makes use of semiconductor triggers, AND and OR-circuits, and ferrite-core memories with square histeresis loop.

A block diagram of the installation is given.

76. Soviet Exhibit of Automation Equipment

"A Robot As Exhibition Guide," by M. A. Alekseyeva; Moscow, Komsomol'skaya Pravda, 6 Oct 62

The technique of automation is presented at the Moscow Polytechnic Museum in the following three sections: Principles of Automation and Remote Control, Telemechanics and Remote Control, and Automatic Protection and Blocking.

The visitors are guided through the exhibit by a robot-guide who explains about automation and remote control and answers questions of the visitors.

77. Utilization of Computers in Railroad Transport

"Electronic Machines in Transport"; Moscow, Moskovskaya Pravda, 12 Oct 62, p 1

An international conference with representatives from Bulgaria, Hungary, east Germany, China, Poland, Czechoslovakia, and the USSR was opened in Moscow on 11 October. The conference discussed problems of applying computers in railway transport.

At the week-long conference, experts from the socialist countries are to exchange experience and work out a program for future cooperative efforts in the field of investigation and practical application of computers to transportation.

78. Automation in USSR

"Our Future Lies in Automation," by O. Aven, Moscow Institute of Automatics and Telemechanics; Kiev, Pravda Ukrainy, 12 Jun 62, p 3

The article contains the following passage:

"Automation is bringing, and has already brought, wonderful changes in our live. Of course, multitude of highly complicated problems have yet to be solved. But they will certainly be solved. The works of such institutes as the Moscow Institute of Automatics and Telemechanics; Kiev Institute of Automation, Gosplan, Ukrainian SSR; and the Georgian Institute of Electronics, Automation, and Telemechanics and many others have contributed considerably to the world's science of automation. Here, Soviet scientists are the leaders of world science."

79. Automatic Control by Nuclear-Powered Generator

"On the Question of Automatic Control by a Power Installation," by A. A. Shevyakov and R. V. Yakovleva; Moscow, Avtomaticheskoye Regulirovaniye Aviadvigateley (Automatic Control of Aircraft Engines--a collection of articles), No 3, 1961, pp 51-65 (from Referativnyy Zhurnal--Avtomatika i Radioelektronika, No 5, 1962, 5-2-163 1)

A study is made of the problems of controlling by means of nuclear-powered installations which operate on thermal neutrons. A power installation is considered which consists of the reactor and a turbocompressor which drives a generator. Autonomous control is used for the installation.

A method is described for finding the optimum controller transition function for given transients which occur with specific stepwise generator load variations and variations of reactivity. Several aspects of the choice of control patterns are discussed. An analysis is made of the differential equations and transition functions of the controlled object and the differential equations of the controllers in the power installation.

80. Limiting Transients in a Nonlinear Automatic Control System

"Limiting the Transient in a Nonlinear Automatic Control System," by Liu Yen-Chu, chair of applied mechanics; Moscow, Vestnik Moskovskogo Universiteta; Seriya I: Matematika, Mekhanika, No 5, Sep/Oct 62, pp 54-59

The paper concerns the problem of limiting the transient of a nonlinear automatic control system by the use of a correcting element.

87. Optimization of Servo Systems

"Optimization of Servo Systems," by L. S. Gnoyenskiy; Moscow, Prikladnaya Matematika i Mekhanika, Vol 26 No 4, Jul Aug 62, pp 766-771

An equation

$L_n(y) = a_0(t)y^{(n)} + a_1(t)y^{(n-1)} + \dots + a_n(t)y = f(t) + c(t)f'(t)$ with initial conditions $y(0) = y'(0) = \dots = y^{(n-1)}(0) = f(0) = 0$ represents a servo system, where $f(t)$ is the control signal whose derivative $f'(t)$, intensified by a variable amplification factor $c(t)$, serves to improve its quality. It is assumed that noise and interference have been filtered from the incoming signal $f(t)$ and also that $f'(t)$ has a finite number of discontinuities over a finite interval of time T .

Given that $\delta(t, f(\tau), c(\tau))$ is the error of $y(t) - f(t)$ and that in the time interval T the index of correspondence for any $f'(t)$ does not exceed some stated value, $\sup \delta(T, f(t), c(t)) \leq A$, the author considers the problem of finding some function $c_{\min}(t)$ which will satisfy the condition $\inf_c \sup_t |\delta(T, f(t), c(t))|$.

The article was submitted on 20 September 1961.

88. Nonlinear Optimal Control Problem

"A Nonlinear Problem in Optimal Control; Formulation of the Problem, Optimal Control Structure, First Integrals," by V. K. Isayev and V. V. Sonin; Moscow, Avtomatika i Telemekhanika, Vol 23, No 9, Sep 62, pp 1117-1129

By means of the maximum principle, some variational nonlinear problems in rocket dynamics are studied. The optimal control structure is analyzed on the assumption that the range of permissible values of the controlling influence is bounded. First integrals of the corresponding equations of optimal motion are proposed.

The article was submitted for publication on 24 October 1961.

89. Algebraic Methods for Determining Optimal Transfer Functions

"An Algebraic Method for Determining an Optimal Transfer Function," by A. N. Sklyarevich; Moscow, Avtomatika i Telemekhanika, Vol 23, No 9, Sep 62, pp 1154-1164

81. Algorithms for Complexities of Discrete Functions

"Algorithms for Complexities of Discrete Functions" (presented by Academician A. N. Kolmogorov, 13 Feb 62), by Yu. Ofman; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 1, 1 Jul 62, pp 48-51

The author considers the problem of deriving algorithms for the operation of binary automata, based on the formula:
 $Z_i(t+1) = f_i[Z_{ri}(t), Z_{si}(t)]$. $Z_i(t) = 0$ and $Z_i(t) = 1$ are the two possible states of the automata ($t = 1, 2, \dots$).

Three types of automata are considered: (1) an automaton which searches for an element by binary number, (2) an automaton for addition of binary numbers, and (3) an automaton for addition of a large number of terms. The concepts of "cascades" and automata without feedback are also discussed.

82. Classification of Automatic Systems According to Principles of Control

"Classification of Automatic Systems According to Principles of Control," by O. M. Kostyuk; Kiev, Avtomatika, No 4, 1962, pp 12-20

In practice, classification of automatic systems into systems with control by variation of the controlled magnitude (control by disturbances) or into combined systems is made according to the form of the structure of the system. However, research on the equivalence of control systems has shown that each of the known principles of control may be realized, not in one, as was previously thought, but in at least two different ways. This means that any system may have, in principle, not one, but several structural schemes, i.e., it may be single-loop, double-loop, or multi-loop. Therefore, one structural scheme alone cannot define uniquely the properties of the system from the standpoint of the principles of control.

Some general aspects of the problem of the equivalence of systems are considered in the paper; in particular, a general method of solution is outlined, and the most important conclusions are formulated, these conclusions following from the results of some special solutions of such a problem concerning the classification of systems from the standpoint of the principles of control. The conclusions are as follows:

1. Different principles of control (both by disturbances and by variation of the controlled magnitude) can be realized, not by a single method, but by at least two different methods. In view of this, even the

simplest systems with one principle of control have not less than two different structural schemes -- one representing the physically attained method of control and the others being equivalent to it.

2. The combined principle of control may be realized in at least three ways. Therefore, even the simplest combined systems have at least three different structural schemes -- one representing the physically attained method of control and the others being equivalent to it.

3. All physical multiloop systems have their double-loop and, as a special case, their single- and zero-loop equivalents. The optimistic hopes that multiloop systems may possess some new, special properties lacking in double-loop systems are unfounded. The use of many physical loops should be regarded as a means of realizing the complex transfer functions of the individual links in the double-loop equivalent of the system.

4. Systems have a single-loop equivalent and, therefore, may be called single-loop in nature if the physical links (one or more) are attained on only one coordinate or only by disturbances acting on the controlled member. Systems have a double-loop equivalent and, therefore, may be called double-loop in nature if the physical links (two or more) are attained on two or more coordinates of the system, including disturbances.

5. All double-loop systems -- in the sense indicated by the foregoing -- are, by their natures, combined systems.

The article was submitted for publication on 25 May 1961.

83. Extremal Control Step Systems

"Dynamic Regimes of Extremal Control Step Systems, Part I," by P. I. Akinin; Kiev, Avtomatika, No 4, 1962, pp 34-41

A step-type extremal control system with one controlling action, the controlled member of which is replaced by a linear inertial link and a link following it with an extremal characteristic, is considered under conditions of displacement of the extremum point. Relationships are given which allow selection of the control parameters in such a way that stable operation in the optimum regime is guaranteed for displacements of the extremal characteristic at a constant rate in an arbitrary direction.

The article was submitted for publication on 14 February 1961.

84. Self-Adjusting Systems With Temporary Storage of Extremum

"An Experimental Study of a Self-Adjusting (Extremal) System With Temporary Storage of the Extremum," by V. A. Mitroshin and P. I. Chinayev; Kiev, *Avtomatika*, No 4, 1962, pp 49-59

The results are given for an experimental study of an extremal control system automatically searching out and retaining the extremum. The effect of static characteristics and the dynamic characteristics of the controlled object on the quality of control is shown. The behavior of the system in a dynamic situation is studied.

The article was submitted for publication on 28 July 1959.

85. Cybernetics and Control Theory

"The Problem of Establishing High-Quality Automatic Control Systems With Units Having Variable Parameters" (presented by Academician B. N. Petrov, 14 Mar 62), by S. V. Yemel'yanov and M. A. Bermant, Institute of Automatics and Telemechanics; Moscow, Doklady Akademii Nauk SSSR, Vol 145, No 4, 1 Aug 62, pp 748-751

In some cases, the necessity arises for establishing automatic control systems with units whose parameters vary within fairly wide limits. In the article, an attempt is made to solve this problem by using properties of automatic control systems with variable structure -- a subject already covered by Yemel'yanov in a previous paper (*Avtomatika i Tele-mekhanika*, 20, No 7, 1959). The possibility is considered for establishing, by means of some fixed piecewise linear control law, automatic control systems in which the quality of the intermediate operations changes only slightly (within acceptable limits) for large variations in the parameters of the units.

86. Problems in Optimal Control

"Some Problems in the Theory of Optimal Control" (presented by Academician L. S. Pontryagin, 15 Mar 62), by Yu. V. Yegorov, Moscow State University imeni M. V. Lomonosov; Moscow, Doklady Akademii Nauk SSSR, Vol 145 No 4, 1 Aug 62, pp 720-723

The author discusses some problems in the theory of optimal control by operations which can be expressed as partial differential equations. Included are the existence of optimal control, its uniqueness, and methods for finding it in practice.

Algebraic equations are derived for the determination of the transfer function of a physically feasible dynamic system which is practically optimal with respect to the condition of minimum variance of the reproductive error for a sufficiently large operating time.

90. Dynamic and Statistical Properties of Automatic Phase Frequency Control Systems With Quadratic and Combined Damping

"Analysis of Dynamic and Statistical Properties of an Automatic Phase Frequency Control System With Quadratic and Combined Damping," by Yu. N. Bakayev; Moscow, Avtomatika i Telemekhanika, Vol 23, No 9, Sep 62, pp 1179-1185

Properties of automatic phase frequency control are compared for linear, quadratic, and combined damping. The problems of system stability, determination of duration of transients, and noise control are studied.

91. Special Control in Linear Optimal Operations

"Special Control in Optimal Operations Which Are Linear With Respect to the Controlling Influences," by Yu. I. Parayev; Moscow, Avtomatika i Telemekhanika, Vol 23, No 9, Sep 62, pp 1202-1209

There is discussed a problem of the application of Pontryagin's maximum principle to control operations which are expressed by a system of ordinary differential equations, the right sides of which are linear with respect to the controlling influences.

92. Minimization of Logic Functions of a Large Number of Variables

"Minimization of Logic Functions of a Large Number of Variables," by V. D. Kazakov; Moscow, Avtomatika i Telemekhanika, Vol 23, No 9, Sep 62, pp 1237-1242

The algorithm for minimizing incompletely specified logic functions is considered. With aid of electronic computers (general-purpose or specialized), the algorithm makes it possible to find near-minimum expressions for functions of up to 20 variables. An example of the application of the algorithm is given, and an estimate is made of the number of elementary steps required for minimizing a function of n variables.

93. New Computer Mekipt-1

"40 Minutes Instead of Eight Days"; Kiev, Pravda Ukrainy,
27 Sep 62, p 4

A new computer developed by the Timishoara Polytechnic Institute of Rumania is called the Mekipt-1.

Several problems have already been solved with great accuracy on the Mekipt-1. Among these were tables to determine the pressure of building foundations on various kinds of soil. The Mekipt-1 carried out this calculation in 40 minutes. This would have taken about 8 days with ordinary calculating machines.

94. Bulgarian Analogue Computer

"The First Bulgarian Electronic Computer," Engr T. Tonchev,
Director of the "Elektronika" Developmental Enterprise, Sofia;
Sofia, Tekhnicheskoe delo, 15 Sep 62, p 1

Work on the production model of Bulgaria's first electronic analogue computer, "Analog No 1," was begun less than 2 years ago at the "Elektronika" Developmental Enterprise and is already completed. The operation of the computer is based on the principle of analogy whereby every mathematical and physical value is made to correspond to a quantity of electrical voltage. With the aid of computer units between the voltages, the same functions are maintained as exist between mathematical and physical values. The solution is obtained automatically, and by means of scaling circuits between the actual values and their electrical analysis, it is reduced to the proper mathematical or physical form. The solution is graphic. It is continuously traced by an electronic beam on an oscilloscope built into the computer. Coefficients involved in a differential equation can be varied during a solution in such a way that the initial conditions are altered to present optimum solution. This operative flexibility reduces a thousandfold the prolonged analysis of hundreds of alternatives for a given problem.

95. Czech Progress in Machine Translation

"Machine Translation," by Petr Sgall, Candidate of Sciences;
Prague, Technicky Magazin, No 9, Sep 62, pp 520-521

The new Czechoslovak EPOS automatic computer holds promise for significant progress in machine translation. During 1962, this computer is to be used for the translation of running electrical engineering text from English. Some components of the algorithms for synthesis

of the Czech text are now being tested on the LGP-30 machine at the Center for Numerical Mathematics (Centr numericke matematiky) of the Mathematics and Physics Faculty of Charles University in Prague.

The first efforts at machine translation of English into Czech were made in January 1960, with a SAPO computer, at the Research Institute of Mathematical Machines (the linguistic basis was prepared at the Faculty of Philosophy of Charles University). This involved translation of individual sentences because the memory unit of the SAPO was not large enough to store a larger dictionary. (FOR OFFICIAL USE ONLY) (COPYRIGHT by the State Publishing House for Technical Literature, Prague, 1962)

96. Status of Cybernetics in Hungary

"On the Path of Cybernetics From the Universities to the Academy," by Emil Szluka; Budapest, Nepszabadsag, 23 Sep 62, p 7

Cybernetic research and teaching is restricted to one pioneer department at each of the technical universities. Significant work is being done at Budapest Technical University at the departments of electricity, mathematics, wire-communications, and automation, although cooperation between the departments is faulty.

The philosophy of cybernetics is being treated properly at the university's department of Marxism-Leninism, and the Marxist view of cybernetics is disseminated in university publications. However, the universities as a whole, especially such important departments as chemical and mechanical engineering, lack the goals which the need to automate industrial processes makes so urgent. While cybernetic procedures are being worked out at the Ministry of Heavy Industry and an electronic computer is maintained there to help solve the problems of mining, metallurgy, and the chemical industry, such topics occur very rarely in the scientific research plans of the universities.

Reorganization of university teaching material to give cybernetics its proper emphasis is being retarded partly by the attitude of certain professors and partly by lack of computers. Only Budapest Technical University has a computer, and it is primarily for demonstration rather than practical use.

The Hungarian Academy of Sciences has been very silent on the subject of cybernetics. Three years ago, the presidium of the academy established the Cybernetics Commission of the Presidium (Elnoksegi Kibernetikai Bizottsag). To date, this group has worked out three proposals but made no further progress.

Within the academy itself, cybernetics is not receiving the emphasis and attention it deserves in the life of the scientific departments. There is no society nor publication which is concerned with it. These lacks have a harmful effect on the theoretical cybernetic research of various academy institutions. For a long time now the direction and determination of the tasks of the computer engineering center of the academy have been makeshift and unsettled; there have been many complaints from institutes, such as the institute of "neurobiology" of Academician Kalman Lissak, where cybernetics research is being conducted. These institutes are having trouble developing and keeping up with foreign results.

Implementation of the long-range research plans of the Council for Science and Higher Education is the only thing which can serve as a basis for systematic work and initiate regular cybernetic research at scientific institutes and in all departments of the universities. However, the Academy of Sciences must control the scientific forces concerned with cybernetics and promote organized scientific activity in all fields of cybernetics.

Hungarian scientists are already in close contact with foreign scientists, most effectively with those of the Soviet Union and the people's democracies. It is certain that Hungarian cyberneticists will soon coordinate their research with the cooperative scientific efforts which have begun in this field among the socialist countries. Their theoretical work should be tied in with the possibilities offered by CEMA as soon as possible, especially in regard to computers. In this field, Hungary has not even made a beginning. It is time to make use of the advantages of international cooperation and to establish regular contacts.

Power Engineering97. High-Voltage Impulse Generator

"Scientific and Technical News"; Moscow, Trud, 28 Jun 62, p 3

A short note reads as follows:

"The High-Voltage Department of the All-Union Electrical Engineering Institute imeni V. I. Lenin, in Moscow, designed and built, under the direction of Engr P. Terent'yev, a unique generator that has no equal in the world. This generator creates a voltage up to 7.2 million volts. This installation is intended for testing high-voltage equipment used on extra-long transmission power lines."

98. Operation of Hydraulic Generators As Synchronous Condensers

"Laboratory Investigation of Switching Vertical Hydraulic Generators to Operation As Synchronous Condensers," by Kh. A. Vel'ner and L. L. Paal', Tallinn Polytechnic Institute; Minsk, Izvestiya Vysshikh Uchebnykh Zavedeniy, Energetika, No 9, Sep 62, pp 108-155

The power factor of electric networks can be raised by placing some of the hydraulic generators in operation as synchronous condensers. It is proposed to have provisions for switching one or several of the hydraulic generators, as conditions may require, to operate as synchronous condensers on the following hydroelectric power plants now under construction: the Votkinskaya, Novosibirskaya, and Krasnoyarskaya. To reduce the resistance offered to the wheel by water, the water must be forced out of the turbine casing by compressed air.

Difficulties encountered on the Dneprovskaya and Ust'-Kamenogorskaya hydroelectric power plants in the process of putting some of the hydraulic turbines into operation as synchronous condensers were due to the insufficient capacity of pneumatic installations at those plants. Forcing the water out of the turbine casing was accompanied by a large loss of compressed air through the draft tube. In some cases, efforts to force water from the turbine casing failed completely.

Optimum conditions for forcing water out of the turbine casing were studied at the Hydraulic Laboratory of the Tallinn Polytechnic Institute. The experiments were conducted with water wheels PL-661-25 and RO-697-25 and draft tubes LMZ 4A and 4E. The hydraulic turbine during the experiment was rotated at 300-900 rpm. Observations on this laboratory model have shown that during operation of a hydraulic generator as a synchronous condenser, undesirable periodic fluctuations of water level are observed in the draft tube.

99. Concrete Towers on 500-Kilovolt Transmission Power Line

"Votkinskaya Hydroelectric Power Plant -- Sverdlovsk"; Moscow, Pravda, 20 Oct 62, p 1

A short note reads as follows:

"Construction of the 500,000-volt electric power transmission line connecting the Votkinskaya Hydroelectric Power Plant and the city of Sverdlovsk has been completed. This power line of more than 400 kilometers crosses the Ural Mountains. Reinforced concrete towers were used for the first time on a line with such high voltage.

The current from the Votkinskaya Hydroelectric Power plant will reach Sverdlovsk in time for the 45th anniversary of the October Revolution."

100. New 750,000-Volt Power Line in Process of Design

"Voltage of 750,000 Volts"; Moscow, Pravda, 11 Oct 62, p 4

A short announcement reads as follows:

"At a tremendous voltage of 750,000 v, the power from the Konakovskaya State Regional Electric Station near Moscow, which is now in the process of construction, will be supplied to Moscow. The project for this experimental industrial electric power line is now in the design stage at the 'Energoset-proyekt' Institute.

Soviet power engineers, reports Chief Engineer of the Institute S.S. Rokotyan (Lenin Prize winner), already have almost 3 years' experience in operating a powerful electric transmission line of 500,000 v. At present the total length of these lines is 4,000 km, and toward the end of the Seven-Year Plan, it will increase 2.5 to 3 times. Along such lines, which have transmission capacity of up to one million kw to a single point, the power can be transmitted to a distance of 900 to 1,200 km. However, the rate of Soviet power development is such, that the necessity has now become evident of building even more powerful lines, able to transmit 2-3 million kw for a distance of up to 3,000 km at high efficiency. It is expected that such power lines will connect large power systems in the USSR within the next 10 to 20 years.

"Electrical engineering institutes and plants are now designing equipment for an experimental-industrial 750,000-volt line which will run for 90 km in the Moscow region. It is scheduled for operation by the end of the Seven-Year Plan."

101. Frequency Conversion in Synchronous Drive Operation

"On the Study of the Steady-State Regime of a Controlled Synchronous Drive Fed From an Ionic Frequency Converter," by M. Khusanov; Tashkent, Voprosy Energetiki, Avtomatiki, Gornogo Dela i Legkoy Promyshlennosti (Problems of Power Engineering, Automatics, Mining, and Light Industry), Academy of Sciences Uzbek SSR, 1961 pp 49-56 (from Referativnyy Zhurnal -- Elektrotehnika i Energetika, No 15, 15 Aug 62, 15 K 22)

Problems are considered which involve the steady-state control of the speed of a synchronous motor for which the frequency is controlled by an ionic frequency converter. Such a control guarantees the following: the independence of speed of the change of loading moment over the entire control range; sufficient mechanical rigidity at low speeds by changing the stator voltage and excitation current; reduced sensitivity to the fluctuations of voltage from the power source; and the possibility of operating at $\cos \varphi = 1$.

The results are given of a study of an electric drive system comprising an ionic frequency converter and synchronous motor in steady-state regimes. The basic electromechanical properties of such a system are determined. It is shown that the operation is influenced by a variation of motor excitation current, the capacitance of the commutation circuits of the autonomous inverter, and other factors.

The external and operating characteristics were determined experimentally.

102. Recent Improvement in Fuel Cells

"Electric Flame," by L. Yur'yev, Moscow; Komsomol'skaya Pravda, 28 Oct 62, p 4

Soviet scientist Davtyan has built a fuel cell operating on producer gas. The cell consists of a low steel cylinder to which is supplied heated producer gas and air. The producer gas in flowing over the negative electrodes of the cylinder yields its electrons, i.e., "burns," and the cell thus generates electric power. The installation does not have a single moving part, and its efficiency is up to 58%.

The Laboratory of Academician Aleksandr Naumovich Frumkin developed a hydrogen fuel cell having an efficiency of about 60%.

Not very long ago tractors powered with fuel cells were tested out in plowing fields. It might take another decade, or even more, before fuel cells will be perfected.

103. Large Gas Turbines

"Gas Turbine Installations for Large Power Systems and the Fundamental Scientific Research Problems in Their Design," by M. I. Korneyev, D.V. Litvinov, V.G. Tyryshkin, and G.A. Ogloblin; Moscow, Energomashinostroyeniye, No 9, Sep 62, pp 1-5

At the start of 1962 prototype gas turbines of 12, 15, and 50 Mw capacity were built and were ready to undergo actual operating tests at some of the existing electric power plants, while the Leningrad Metals Plant and the Khar'kov Turbogenerator Plant have designed a 100-Mw gas turbine.

The Central Scientific Research Boiler and Turbines Institute, the All-Union Heat Engineering Institute, the Siberian Department of the Academy of Sciences USSR, the Moscow Higher Technical School, the Leningrad Polytechnic Institute, and the Khar'kov Polytechnic Institute have conducted extensive research on the problem of the practicability of large gas turbines.

Wide application of gas turbines in industry will now depend on the success of actual exploitation of the gas turbines already built. One of the most promising means for increasing the capacity of gas turbines is by increasing the initial temperature of the gases to 1,300 C.

104. Solar-Power Installation in Turkmen SSR

"Advance on the Desert" Leningrad, Vecherniy Leningrad, 30 May 62, p 2

Workers of the Physico technical Institute, Academy of Sciences Turkmen SSR, are conducting a study on utilization of solar energy in industry and for domestic uses. The Solar Energy Laboratory of the Power Engineering Institute imeni G.M. Krzhizhanovskiy has delivered to a desert site, not far from Ashkhabad, a helio-installation.

The experiments conducted are of great practical importance.

Miscellaneous105. Protection of Soviet Patent Priority

"Utilization of Patent Literature and Protection of USSR Invention Priority," by N. S. Kuznetsov; Moscow, Energomashinostroyeniye, No 9, Sep 62, p 40

A few passages from the article read as follows:

"The Scientific Council of the Central Scientific Research Institute for Technology and Machine Design heard a report by the Deputy Chairman of the Committee on Inventions and Discoveries, Council of Ministers USSR,

V.A. Popov, entitled 'Utilization of Patent Literature and Protection of USSR Invention Priority.' The statistics presented in the report indicate that the majority of patent applications are filed by individuals, not by scientific and research institutions. The author stresses the importance of timely filing of such applications.

"Not realizing the full significance of some of the inventions, the majority of organizations and enterprises fail to take necessary measures to protect Soviet Scientific research achievements inside the Soviet Union, as well as abroad. Soviet achievements which are not properly filed in the Soviet Union cannot claim protection abroad; and this deprives the Soviet Union of the possibility of realizing them abroad."

106. New Film-Processing Laboratory

"New Laboratory for Motion-Picture Amateurs"; Moscow, Tekhnika Kino i Televideniya, No 10, Oct 62, p 68

The Central Laboratory for processing amateur motion-picture films was opened in Moscow in August 1962. This will be one of the largest motion-picture-processing laboratories in the world. The new laboratory will process 16- and 8-mm color and black-and-white films and will superpose sound track on such films.

The processing capacity of the laboratory will be 20,000 meters per day, and it will service customers from other parts of USSR as well.

107. "Rocket" Drill Developed in USSR

"Rocket Drill in Research of Glaciers"; Prague, Zapisnik, Vol 6, NO 18, 25 Aug 62, p 24

A thermal drill developed by the Academy of Sciences of the Kazakh SSR has drilled to a depth of 10 meters in one hour into a glacier. The drill has a diameter of 12 centimeters and can reach a depth of 100 meters.

The new drill, operated on the rocket principle, substantially accelerates and simplifies research on glaciers. (FOR OFFICIAL USE ONLY) (COPYRIGHT by the Publishing House for Periodicals of the Czechoslovak Ministry of National Defense, Prague, 1962)

108. Soviets Can Destroy US "Spies in the Sky"

"Adventures in Space"; Prague, Letecky Obzor, No 8, Aug 62, pp 258-259

The article discusses various US rockets and US efforts at launching observation satellites such as the SAMOS and MIDAS. Simple artist's sketches of US various rockets and satellites are included. US efforts at military use of such satellites are stressed, but readers are reminded that the "spies in the skies" are vulnerable to Soviet antimissile missiles.

109. Czechoslovak Discussion of US Rocket Aircraft

"X-15 and Dyna-Soar," by Milan Pavlas; Prague, Letecky Obzor, No 8, Aug 62, pp 272-273

The author discusses some of the general features of the US X-15 and Dyna-Soar rocket aircraft, stressing that the purposes of these are military. The article states that in this day of spacecraft capable of guidance by the crew, the US rocket aircraft projects hold little promise of anything basically new although some interesting aspects are involved. The author states that there are no known similar projects being carried on in the USSR, but that after all such projects would yield little of value as Soviet designers already have materials and structural elements which are heat-resistant and reliable rockets which are capable of sending 6 tons into space. However, he says, since the Soviets are planning rocket transportation to distant and inaccessible areas, it is certain that suitable rocket aircraft are being built in the USSR and that additional aircraft based on this principle will be available when contact with inhabited satellites is necessary.

110. Polish Ultrasonic Equipment Designed

"Latest and Most Important in Polish Technology, Science, and Industry"; Warsaw, Horyzonty Techniki, No 9 Sep 62, p 17

Several types of original ultrasonic apparatus have been designed at the Institute of Basic Problems of Technology of the Polish Academy of Sciences, including:

1. A petroscope for examining the quality of concrete;
2. A spectroscope for determining the thickness of metal, glass, and plastic elements; and
3. A universal defectoscope for discovering flaws in metals, porcelain, and technical ceramics.

III. CONFERENCES

111. Recent Conferences in Electronics, Engineering, and Geophysics

The conferences listed below were reported or announced in recent issues of Soviet periodicals. Included in the listing are the date and location of the conference, sponsoring organizations, and source. Unless otherwise indicated, it is assumed that there was no non-Soviet participation in the conferences.

a. Scientific-Technical Conference of Computer Designers; 5-7 October 1962, Vil'nyus. (Sovetskaya Litva, 5 Oct 62, p 4)

b. Ukrainian Republic Scientific-Technical Conference on Instruments of Industrial Control and Means of Automation; 15-18 May 1962, Kiev; sponsored by the Institute of Automatics of Gosplan Ukrainian SSR, the Exposition of Advanced Achievements in the National Economy of the Ukrainian SSR, and the Ukrainian Republic and Kiev Oblast Boards of the Scientific-Technical Society of the Instrument Building Industry. (Pribo-rostroyeniye, No 9, Sep 62, p 32)

* c. Tenth Conference on Cathode Electronics; 23-30 November 1961, Tashkent. (Radiotekhnika i Elektronika, Vol 7, No 9 Sep 62, entire issue)

d. All-Union Conference on the Propagation of Radio Waves Under Mountainous Conditions; last of August 1962, Frunze; sponsored by the Laboratory of Radio Wave Propagation and Antennas of the Institute of Physics, Mathematics, and Mechanics of the Academy of Sciences Kirgiz SSR. (Sovetskaya Kirgiziya, 26 Aug 62, p 4)

e. 17th All-Union Scientific Session Devoted to Radio Day; 19-23 June 1962, Moscow; sponsored by the Scientific-Technical Society of Radio Engineering and Electrical Communications inemi. A. S. Popov, the State Committee of the Council of Ministers USSR on Radio Electronics, the Ministry of Communications USSR, the All-Union Scientific Council on Radio Physics and Radio Engineering of the Academy of Sciences USSR, and the State Committee of the Council of Ministers USSR on Electronic Engineering; representatives from Hungary, the German Democratic Republic, Poland, rumania, US, France, Czechoslovakia, and Switzerland. (Radiotekhnika, No 9, Sep 62, p 75)

f. Odessa Scientific-Technical Conference Devoted to Radio Day; 14-23 May 62, Odessa; sponsored by the Odessa Oblast Board of the Scientific-Technical Society of Radio Engineering and Electrical Communications and the Odessa Electrical Engineering Institute of Communications. (Radiotekhnika, No 9, Sep 62, p 78)

g. Scientific-Technical Conference on Improving the Quality of Television Broadcasts; 9-13 June 1962, Odessa; sponsored by the Ukrainian Republic and Odessa Oblast Boards of the Scientific-Technical Society of Radio Engineering and Electrical Communications imeni A. S. Popov, the Ministry of Communications Ukrainian SSR, and the Odessa Electrical Engineering Institute of Communications. (Tekhnika Kino i Televideniya, No 10, Oct 62, p 90)

h. Fourth All-Union Conference on the Theory of Plates and Shells; 24-? October 1962, Yerevan; sponsored by the Institute of Mathematics and Mechanics of the Academy of Sciences Armenian SSR; representatives from Bulgaria and Poland. (Kommunist, 25 Oct 62, p 2)

i. Second Congress of the Scientific-Technical Society of the Machine Building Industry; January 1962, Moscow. (Vestnik Mashino-stroyeniya, No 4, Apr 62, p 85)

j. Intervuz Conference on the Problem of Vibrations of Mechanical Systems; 30 May-5 June 1962, Riga; sponsored by the Riga Polytechnic Institute and the Institute of Automatics and Telemechanics of the Academy of Sciences Latvian SSR; next conference, in 1965, in Riga. (Stroitel'naya Mekhanika i Raschet Sooruzheniy, No 5, 1962, p 48)

k. Symposium on Convective Heat Exchange in the Flow of an Incompressible Liquid; 7-9 June 1962, Kaunas; sponsored by the Institute of Power Engineering and Electrical Engineering of the Academy of Sciences Lithuanian SSR. (Inzhenerno-Fizicheskii Zhurnal, No 10, Oct 62 p 125)

l. Second Congress of the Scientific-Technical Society of the Power Engineering Industry; 10-11 January 1962, Leningrad. (Gazovaya Promyshlennost', No 4, Apr 62, p 56)

m. Scientific-Technical Conference of the Moscow Power Engineering Institute on Results of Work Performed in 1961; March 1962, Moscow. (Gidrotekhnicheskoye Stroitel'stvo, No 9, Sep 62, p 59)

n. All-Union Scientific-Technical Conference Devoted to Problems of the Economy of Production, Transportation, Storage, and Use of Gas Fuel' 17-19 October 1962, probably Yerevan. (Kommunist, 20 Oct 62, p 3)

o. Fifth All-Union Conference on Mudflows; 22-? October 1962, Baku; sponsored by the Academy of Sciences USSR, the Academy of Sciences Azerbaydzhan SSR, and the Union Ministries of Railroads and Transport Construction. (Bakinskiy Rabochiy, 23 Oct 62, p 3)

p. Second Conference on the Problem of Climate Conversion; 11-13 June 1962, Leningrad; sponsored by the Main Geophysical Observatory imeni A. I. Voyeykov, the Institute of Applied Geophysics, and the Institute of Geography of the Academy of Sciences USSR. (Izvestiya Akademii Nauk SSSR, Seriya Geograficheskaya, No 5, 1962, pp 184-187)

112. Transcaucasian Conference on New Welding Methods

"Path Into the Future"; Tbilisi, Zarya Vostoka, 13 Oct 62, p 2

The concluding session of the Transcaucasian Conference on introduction of new welding methods took place at the Engineering Hall. The conference was attended by Prof Islafil Piriyeovich Kuliyeu from Baku, Candidate of Technical Sciences Igor' Konstantinovich Pokhodnya from Kiev, Doctor of Technical Sciences I. I. Frumin, Doctor of Technical Sciences N. N. Kochanovskiy, Academician Ferdinand Nestorovich Tavadze, Boris Yvgen' yevich Paton, and others.

A new welding method with powdered-metal welding rod was described by I. K. Pokhodnya, and practical application of this method was suggested in the construction of off-shore oil wells. It is claimed that a welded joint obtained with a powdered-metal rod has very high resistance to the action of a corrosive medium, such as sea water.

113. International Symposium on Ultrasonic Material Testing

Announcement; Berlin, Neue Huette, No 9, Sep 62, p 537

"The First International Symposium on Ultrasonic Materials Testing will be held, at Weimar, on 14-15 November 1962. The following lectures are to be given by the individuals indicated:

1. Karutkraemer, Federal Republic of Germany -- "Testing and Acceptance Conditions in Ultrasonic Testing"
2. Bradfield, United Kingdom -- "Improved Methods for Ultrasonic Testing of Heavy Forgings"
3. Reti, Hungary -- "Experience With Ultrasonic Testing of Forgings, Particularly in the Construction of Steam Turbines"
4. Kipka, German Democratic Republic -- "Contribution to Ultrasonic Testing of Forgings for General Machine Building"
5. Beckman, German Democratic Republic -- "Ultrasonic Investigations During Hot Run Tests of Large Rotors"

6. Vetter, German Democratic Republic -- "Investigations Involving Stressed Components of Power-Producing Machines and Marine Drive Shafts, Designed To Increase the Reliability of Ultrasonic Testing of Large Forgings"

"Interested persons are urged to request invitations from the Chamber of Technology, Berlin, W 8, Eberstrasse No 27."

114. Hungarian Conference on Optics, Acoustics, and Film Technology

Unsigned, untitled article; Budapest, Nepszabadsag, 2 Oct 62, p 10

Thus far 50 foreign specialists have reported their intention of attending the scientific conference being sponsored by the Society of Optics, Acoustics, and Film Technology in Budapest. The conference will open on 15 October."

[Comment: The above item is translated in its entirety. FDD has no knowledge of previous announcements concerning the conference.]

115. Meeting of German Society for Measuring Technology and Automation

"Annual Meeting of the DGMA, 1962"; Berlin, Automatisierung, No 9, Sep 62

"The German Society for Measuring Technology and Automation (Deutsche Gesellschaft fuer Messtechnik und Automatisierung) will hold its first annual meeting on 6-7 December 1962 at the Karl-Marx University in Leipzig. The meeting will be held in the form of a series of lectures; a membership meeting will also take place. A reception for members and guests is scheduled for the evening of 6 December.

"Those interested in participating are urged to contact the secretariat of the society, Berlin, W 8, Eberstrasse 27, for reservations and overnight accommodations and should submit the texts of proposed lectures."

116. Telecommunications Conference in East Germany

"Conference on Telecommunications Technology and Power Supply";
Berlin, Nachrichtentechnik, No 10, Oct 62, p U 115

The "Power and Water Supply" and "Electrotechnology" Associations of the Chamber of Technology will hold a conference on "Telecommunications and Power Supply," in Leipzig, on 15-16 November 1962. The following lectures are scheduled to be delivered:

1. Operating experiences with TFH [carrier-frequency transmission via power lines] links over lines up to 400 kilovolts.
2. Using data-processing devices in load distribution.
3. Selective protection via TFH links.
4. Telecommunications tasks in connection with automatic load and frequency regulation (including delivery load regulation).
5. Operating experiences in the application of fully transistorized TFH devices.
6. High-frequency measuring decoupling between different interconnected systems.
7. Remote control of transformer substations.

Invitations to the conference will be sent out by mid-October 1962. Advance notification is requested from enterprises, institutes, and individuals wishing to attend. Fees for attending the conference are DM 18.00 for nonmembers and DM 12.00 for members of the Chamber of Technology. Information about the conference may be obtained from the secretariats of the "Power and Water Supply" and "Electrotechnology" Associations, Berlin W 8, Clara-Zetkin-Strasse 115-117, Tel No 225531, Extension 69/70 or 48/49.

117. Additional Information on East German Ultrasonic Testing Conference

"First International Symposium"; Berlin, Feingeraetetechnik, No 10, Oct 62, p 456

"The First International Symposium on Ultrasonic Materials Testing will be held, in Weimar, on 14 and 15 November 1962. The subject under discussion will be the status of the international development of instruments and procedures in connection with the ultrasonic testing of metallic materials.

"Both GDR and foreign specialists will deliver lectures. Lecture applications have already been received from persons in the German Democratic Republic, the [West] German Federal Republic, the Soviet Union, Poland, Hungary, Czechoslovakia, Austria, France, and Great Britain. There will also be an exhibit of instruments and books to give persons at the conference an opportunity to learn about modern devices and technical literature. The conference will conclude with scientific and technical movies.

"Applications for participation in the conference are to be sent to the central administration of the Chamber of Technology, Berlin W 8, Ebertstrasse 27, Tel. 22 55 31. Additional information may be obtained at this address or at the Bezirk administration of the Chamber of Technology in Magdeburg, Magdeburg, Humboldtstrasse 14."

118. Carpatho-Balkan Geological Association Session in Bulgaria

"Session of the Carpatho-Balkan Geological Association";
Sofia, Rabotnicesko Delo, 18 Oct 62, p 4

A session of the Carpatho-Balkan Geological Association of the International Geological Congress was held, in Sofia, on 17 October 1962. Present at meetings of the association's mineralogy and geochemistry section and hydrology and engineering geology section were representatives from the Soviet Union, Poland, Czechoslovakia, Rumania, Yugoslavia, and Bulgaria.

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Central Intelligence Agency

7 September 2004

Ms. Roberta Schoen
Deputy Director for Operations
Defense Technical Information Center
7725 John J. Kingman Road
Suite 0944
Ft. Belvoir, VA 22060

Dear Ms. Schoen:

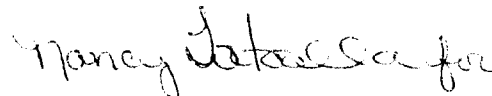
In February of this year, DTIC provided the CIA Declassification Center with a referral list of CIA documents held in the DTIC library. This referral was a follow on to the list of National Intelligence Surveys provided earlier in the year.

We have completed a declassification review of the "Non-NIS" referral list and include the results of that review as Enclosure 1. Of the 220 documents identified in our declassification database, only three are classified. These three are in the Release in Part category and may be released to the public once specified portions of the documents are removed. Sanitization instructions for these documents are included with Enclosure 1.

In addition to the documents addressed in Enclosure 1, 14 other documents were unable to be identified. DTIC then provided the CDC with hard copies of these documents in April 2004 for declassification review. The results of this review are provided as Enclosure 2.

We at CIA greatly appreciate your cooperation in this matter. Should you have any questions concerning this letter and for coordination of any further developments, please contact Donald Black of this office at (703) 613-1415.

Sincerely,



Sergio N. Alcivar
Chief, CIA Declassification Center,
Declassification Review and Referral
Branch

Enclosures:

1. Declassification Review of CIA Documents at DTIC (with sanitization instructions for 3 documents)
2. Declassification Status of CIA Documents (hard copy) Referred by DTIC (with review processing sheets for each document)

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Processing of OGA-Held CIA Documents

The following CIA documents located at DTIC were reviewed
by CIA and declassification guidance has been provided.

OGA Doc ID	Job Num	Box	Fldr	Doc	Doc ID	Document Title	Pub Date	Pages	Decision	Proc Date
AD0343932	78-03117A	213	1	18	5117	Scientific Information Report Chinese Science (34)	10/22/1963	89	Approved For Release	3/29/2004
AD0344702	78-03117A	214	1	21	5149	Scientific Information Report Chinese Science (35)	11/4/1963	133	Approved For Release	3/29/2004
AD0344965	78-03117A	215	1	4	5163	Scientific Information Report Chinese Science (36)	11/7/1963	133	Approved For Release	3/29/2004
AD0345229	78-03117A	215	1	23	5182	Scientific Information Report Chinese Science (37)	11/18/1963	179	Approved For Release	3/29/2004
AD0345750	78-03117A	216	1	20	5209	Scientific Information Report Chinese Science (38)	12/11/1963	174	Approved For Release	3/29/2004
AD0344419	78-03117A	217	1	20	5241	Scientific Information Report Chinese Science (39)	12/27/1963	75	Approved For Release	3/29/2004
AD0346493	78-03117A	218	1	21	5277	Scientific Information Report Chinese Science (40)	1/10/1964	115	Approved For Release	3/29/2004
AD0346725	78-03117A	219	1	27	5320	Scientific Information Report Chinese Science (41)	1/27/1964	78	Approved For Release	3/29/2004
AD0347051	78-03117A	220	1	25	5359	Scientific Information Report Chinese Science (42)	2/6/1964	78	Approved For Release	3/29/2004
AD0347849	78-03117A	221	1	39	5407	Scientific Information Report Chinese Science (43)	3/2/1964	174	Approved For Release	3/29/2004
AD0347929	78-03117A	222	1	25	5438	Scientific Information Report Chinese Science (44)	3/5/1964	104	Approved For Release	3/29/2004
AD0348352	78-03117A	223	1	20	5479	Scientific Information Report Chinese Science (45)	3/20/1964	117	Approved For Release	3/29/2004
AD0349491	78-03117A	225	1	18	5560	Scientific Information Report Chinese Science (46)	4/24/1964	118	Approved For Release	3/29/2004
AD0349657	78-03117A	225	1	34	5581	Scientific Information Report Chinese Science (47)	5/4/1964	98	Approved For Release	3/29/2004
AD0332751	78-03117A	183	1	29	3940	Scientific Information Report Electronics And Engineering (22)	10/19/1962	68	Approved For Release	3/29/2004
AD0333146	78-03117A	186	1	20	4041	Scientific Information Report Electronics And Engineering (23)	11/23/1962	73	Approved For Release	3/29/2004
AD0334103	78-03117A	188	1	37	4136	Scientific Information Report Electronics And Engineering (24)	12/20/1962	62	Approved For Release	3/29/2004
AD0334236	78-03117A	190	1	40	4217	Scientific Information Report Electronics And Engineering (25)	1/22/1963	48	Approved For Release	3/29/2004
AD0334769	78-03117A	193	1	39	4339	Scientific Information Report Electronics And Engineering (26)	2/28/1963	68	Approved For Release	3/29/2004
AD0335480	78-03117A	196	1	17	4436	Scientific Information Report Electronics And Engineering (27)	3/21/1963	95	Approved For Release	3/29/2004
AD0336306	78-03117A	199	1	2	4538	Scientific Information Report Electronics And Engineering (28)	4/25/1963	69	Approved For Release	3/29/2004
AD0332433	78-03117A	183	1	35	3946	Scientific Information Report Organization And Administration Of Soviet Science (5)	10/22/1962	60	Approved For Release	3/29/2004